

Appendix J

Appendix J

Regulatory Impact Review/ Initial Regulatory Flexibility Act (IRFA)/ Magnuson-Stevens Act 303(a)(7) (Practicability) Analysis

1 Introduction

This document combines the analytical requirements of EO 12866, the Regulatory Flexibility Act, and section 303 (a)(7) of the Magnuson-Stevens Act for implementation measures to minimize adverse effects to Essential Fish Habitat for Pacific Coast Groundfish (EFH).

1.1 *Statutory Authority*

Under the Magnuson-Stevens Act, the United States has exclusive fishery management authority over all marine fishery resources found within the EEZ, which extends between 3 and 200 nautical miles from the baseline used to measure the territorial sea. The management of these marine resources is vested in the Secretary of Commerce (Secretary) and in the Regional Councils. The Councils and NMFS prepare FMPs for marine fisheries that require federal action for conservation and management. FMPs require review and approval by the Secretary of Commerce (delegated to NOAA/NMFS). Upon approval by the Secretary, NMFS is charged with carrying out the federal mandates of the Department of Commerce with regard to marine and anadromous fish. The groundfish fisheries in the EEZ off the Pacific coast are managed under the Groundfish FMP. Actions taken to amend FMPs or implement other regulations governing these fisheries must meet the requirements of federal laws and regulations. In addition to the Magnuson-Stevens Act, the most important of these are the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), EO (EO 12866), and the Regulatory Flexibility Act (RFA). While the EFH requirements of the Magnuson-Stevens Act convey no legal authority to the Council and/or NMFS to take similar actions in state waters, several aspects of the proposed rule to minimize impacts from fishing would involve fishing closures and other restrictions in state waters. The economic and socioeconomic analyses conducted in this document assume that states will adopt the measures in these fishing impact minimization alternatives within their waters, where necessary and appropriate.

1.2 *Regulatory Impact Review (RIR) Requirements*

This RIR provides the analysis required under EO 12866. The following statement from the EO summarizes the requirements of an RIR: In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach. EO 12866 requires that the Office of Management and Budget review proposed regulatory programs that are considered to be significant. A significant regulatory action is one that is likely to achieve the following:

1. Have an annual effect on the economy of \$100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities.
2. Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency.
3. Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof.
4. Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this EO.

1.3 Regulatory Flexibility Analysis (RFA) Requirements

The Regulatory Flexibility Act (RFA), first enacted in 1980, was designed to place the burden on the government to review all regulations to ensure that, while accomplishing their intended purposes, they do not unduly inhibit the ability of small entities to compete. The RFA recognizes that the size of a business, unit of government, or nonprofit organization frequently has a bearing on its ability to comply with a federal regulation. Major goals of the RFA are 1) to increase agency awareness and understanding of the impact of their regulations on small business, 2) to require that agencies communicate and explain their findings to the public, and 3) to encourage agencies to use flexibility and to provide regulatory relief to small entities. The RFA emphasizes predicting significant adverse impacts on small entities as a group distinct from other entities and on the consideration of alternatives that may minimize the impacts while still achieving the stated objective of the action. Except in the case when an agency can certify that there is no likelihood of a significant adverse impact on a substantial number of small entities, when an agency publishes a proposed rule, it must prepare and make available for public review an Initial Regulatory Flexibility Analysis (IRFA) that describes the impact of the proposed rule on small entities. When an agency publishes a final rule, it must prepare a Final Regulatory Flexibility Analysis (FRFA). Analysis requirements for the IRFA are described below in more detail.

In the case of the issues and alternatives considered in this analysis, the Council will make recommendations for the preferred alternative, and, if approved by the Secretary, NMFS will develop proposed regulatory amendments to implement the Council's preferred alternative. Many, but by no means all, of the directly regulated entities would be considered small entities under the RFA (Section 601(3)). The IRFA contains the following:

- A description of the reasons why action by the agency is being considered
- A succinct statement of the objectives of, and the legal basis for, the proposed rule
- A description of, and where feasible, an estimate of the number of small entities to which the proposed rule will apply (including a profile of the industry divided into industry segments, if appropriate)
- A description of the projected reporting, recordkeeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record
- An identification, to the extent practicable, of all relevant federal rules that may duplicate, overlap or conflict with the proposed rule
- A description of any significant alternatives to the proposed rule that accomplish the stated objectives of the Magnuson-Stevens Act and any other applicable statutes and that would minimize any significant economic impact of the proposed rule on small entities.

Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives, such as the following:

1. The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities
2. The clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities
3. The use of performance rather than design standards
4. An exemption from coverage of the rule, or any part thereof, for such small entities

In determining the scope, or universe, of the entities to be considered in an IRFA, NMFS generally includes only those entities, both large and small, that are directly regulated by the proposed action. If the effects of the rule fall primarily on a distinct segment, or portion thereof, of the industry (e.g., user group, gear type, geographic area), that segment would be considered the universe for the purpose of this analysis. NMFS interprets the intent of the RFA to address negative economic impacts, not beneficial impacts, and, thus, such a focus exists in analyses that are designed to address RFA compliance.

Definition of a Small Entity

The RFA recognizes and defines three kinds of small entities: 1) small businesses, 2) small non-profit organizations, and 3) small government jurisdictions.

Small businesses. Section 601(3) of the RFA defines a small business as having the same meaning as a small business concern, which is defined under Section 3 of the Small Business Act (SBA). Small business or small business concern includes any firm that is independently owned and operated and not dominant in its field of operation. The SBA has further defined a small business concern as one “organized for profit, with a place of business located in the United States, and which operates primarily within the United States or which makes a significant contribution to the United States economy through payment of taxes or use of American products, materials or labor. A small business concern may be in the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that where the form is a joint venture there can be no more than 49 percent participation by foreign business entities in the joint venture.” The SBA has established size criteria for all major industry sectors in the United States, including fish harvesting and fish processing businesses. A business involved in fish harvesting is a small business if it is independently owned and operated and not dominant in its field of operation (including its affiliates) and if it has combined annual receipts not in excess of \$3.5 million for all its affiliated operations worldwide. A seafood processor is a small business if it is independently owned and operated, not dominant in its field of operation, and employs 500 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide. A business involved in both the harvesting and processing of seafood products is a small business if it meets the \$3.5 million criterion for fish harvesting operations. Finally, a wholesale business servicing the fishing industry is a small business if it employs 100 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide.

Small organizations. The RFA defines small organizations as any not-for-profit enterprise that is independently owned and operated and is not dominant in its field.

Small governmental jurisdictions. The RFA defines small governmental jurisdictions as governments of cities, counties, towns, townships, villages, school districts, or special districts with populations of fewer than 50,000.

1.4 Magnuson-Stevens Act Section 303(a)(7) (Practicability) Requirements

Section 303(a)(7) of the Magnuson-Stevens Act requires that Fishery Management Plans (FMPs) minimize to the extent practicable the adverse effects of fishing on Essential Fish Habitat (EFH). EFH regulations at 50 CFR 600.815(a)(2)(iii) state that:

In determining whether it is practicable to minimize an adverse effect from fishing, Councils should consider 1) the nature and extent of the adverse effects on EFH and 2) the long and short-term costs and benefits of potential management measures to EFH, associated fisheries, and the nation, consistent with national standard 7. In determining whether management measures are practicable, Councils are not required to perform a formal cost/benefit analysis.

The meaning of “practicable” as the term is used in National Standard 9 was recently discussed in Conservation Law Foundation v. Evans, 360 F.3d 21, 27-28 (1st Cir. 2004). In that case, the court stated:

Moreover, the plaintiffs essentially call for an interpretation of the statute that equates "practicability" with "possibility," requiring NMFS to implement virtually any measure that addresses EFH and bycatch concerns so long as it is feasible. Although the distinction between the two may sometimes be fine, there is indeed a distinction. The closer one gets to the plaintiffs' interpretation, the less weighing and balancing is permitted. We think by using the term "practicable" Congress intended rather to allow for the application of agency expertise and discretion in determining how best to manage fishery resources.

In determining which alternatives are practicable, several items are considered relative to one another. These items may include—but are not limited to—the long and short term effects on fish populations, the ecosystem, the fishing industry, management agencies, and the effects on EFH. It is difficult to determine the practicability of EFH protection measures due to limitations on available data. For example, it is generally unknown how fish populations will respond to changes in habitat, though in some cases theory may suggest a particular outcome. In addition, there is often a lack of readily available economic data which would allow analysts to make quantitative, cardinal estimates to assist in determining which alternatives are practicable to the fishing industry. This does not mean that available information is not scientific in nature. Information does exist which enables the analyst to make ordinal and qualitative measurements which pertain to some aspects of practicability. For example, this EIS has described the impact of various gear types on habitat, and the prevailing notion is that bottom trawl gear has the greatest degree of adverse impact on habitat. That information can be balanced against the knowledge of which habitat types have been determined to be sensitive to fishing gear impacts, and compared to historical revenues that have been generated by the trawl industry within those sensitive habitat areas. In any event, the best available science—be it quantitative or qualitative—is used to determine likely outcomes of the options included in the suite of impact minimization alternatives, and these outcomes are described in Chapter 4 of the EIS.

The EIS uses specific factors relevant to the EFH final rule to evaluate the concept of practicability. These factors are used because it is believed that available information is robust enough to make determinations regarding the outcomes of fishing impact minimization measures on these factors, though not necessarily for every alternative. These factors are described below.

Practicability Factor	Relevance to 50 CFR 600.815(a)(2)(iii)	Description
Population and Ecosystem effects as a result of changes in EFH	The long and short-term costs and benefits of potential management measures to EFH and associated fisheries	Change in ecosystem function resulting from changes in EFH
Socioeconomic effects on commercial and recreational fisheries	The long and short-term costs and benefits of potential management measures to associated fisheries and the nation	Change in short and long-term socioeconomic conditions of fishers as a result of impact minimization alternatives
Effects on management, enforcement, and administration	The long and short-term costs and benefits of potential management measures to associated fisheries and the nation	Change and feasibility of management, enforcement, and administration burdens as a result of impact minimization alternatives
Changes to EFH	The nature and extent of the adverse effect on EFH; and the long and short-term costs and benefits of potential management measures to EFH	Change in the extent or quality of EFH as a result of impact minimization alternatives

2 Proposed Action

This section describes the proposed action on which the RIR, IRFA, and practicability analyses are based.

2.1 Purpose and Need

NMFS determined that an EIS was the appropriate NEPA analysis document for the proposed federal action being considered. The determination was based both on the fact that significant impacts may result from implementation of the action and that the action may be controversial. The actions considered in the EIS are needed to meet the EFH requirements of the Magnuson-Stevens Act section 303(a)(7) and the regulatory guidelines developed by NMFS in accordance with section 305(b)(1)(A). The Magnuson-Stevens Act requires amending FMPs to identify and describe EFH for each of the managed species and their life stages. An important theme within the 1996 reauthorization of the Magnuson-Stevens Act is sustainable and risk-averse management of fisheries; it emphasizes the importance of habitat protection to

healthy fisheries. Congress recognized that the greatest long-term threat to the viability of commercial, subsistence, and recreational fisheries is the continued loss of marine, estuarine, and other aquatic habitats.

The primary purpose of the proposed action, covered in this RIR, is the modification of federally managed Pacific coast fisheries to minimize, to the extent practicable, adverse effects on EFH caused by fishing. The secondary objective is to modify the fisheries such that the actions taken also minimize the adverse economic and social impacts imposed on the commercial fishing industry and associated communities.

2.2 *EFH Alternatives*

The EIS includes analyses of alternatives for the description and identification of EFH, alternatives for the identification of habitat areas of particular concern (HAPCs), and alternatives for the minimization of adverse effects on EFH caused by fishing (fishing impact minimization alternatives). Only the minimization alternatives have regulatory actions associated with their adoption and implementation due to their potential to have a direct effect on the management of federal FMP fisheries.

2.2.1 Alternatives Considered but Not Adopted

A total of 23 alternatives (including sub-options and the final preferred alternative) to minimize fishing impacts to EFH were analyzed within the EIS. A brief description of the alternatives analyzed and considered in addition to the preferred alternative is described below. For a more complete description of the alternatives, see chapter 2 of the EIS.

C.1: No Action
C.2: Depth-based Gear-specific Restrictions Option C.2.1: Prohibit large footrope shoreward of 200 fm and fixed gear shoreward of 100 fm (N) and 150 fm (S) C.2.2: Prohibit large footrope throughout the EEZ and fixed gear shoreward of 100 fm (N) and 150 fm (S) C.2.3: Prohibit the use of large footrope trawl gear shoreward of 200 fm and prohibit all fixed gear shoreward of 60 fm (M)
Alternative C.3: Close Sensitive Habitat C.3.1: Close areas $s \geq 2$, $r > 1$, and cumulative trawl hours < 100 (2000-2002) C.3.2: Close areas $s \geq 0.5$, $r \geq 0.5$ and cumulative trawl hours < 100 (2000-2002) C.3.3: The same as Option 1 except no adjustment is made for trawl effort. C.3.4: The same as Option 2 except no adjustment is made for trawl effort.
C.4: Prohibit the Geographic Expansion of Fishing C.4.1: Trawl fisheries prohibited from fishing in untrawled areas 2000-2002. Option C.4.2: Closed to all gear outside 2,000 m
C.5: Prohibit a Krill Fishery
C.6: Close Hotspots
C.7: Close Areas of Interest C.7.1: Bottom trawling. C.7.2: All bottom-contacting activities.
C.8: Zoning Fishing Activities C.8.1: trawls, dredges C.8.2: all bottom-contacting gear types
C.9: Gear Restrictions
C.10: Central California No-trawl Zones
C.11: Relax Gear Endorsement Requirements
C.12: Close Ecologically Important Areas to Bottom Trawl
C.13: Close Ecologically Important Areas to Bottom-contacting Gear
C.14: Close Ecologically Important Areas to Fishing

A crucial element of an IRFA is the “description of any significant alternatives to the proposed rule that accomplish the stated objectives of the Magnuson-Stevens Act and any other applicable statutes and that would minimize any significant economic impact of the proposed rule on small entities.” Based on this guidance there are 5 other alternatives that were designed to accomplish the objective of protecting EFH while minimizing economic impacts on small entities. These include alternatives C.3.1, C.3.2, C.4, C.10, and C.12. Alternatives C.3.1 and C.3.2 were designed to close areas to trawling that were not critical to the economic future of the trawl industry; alternative C.4 was designed to protect EFH by limiting future expansion of fishing areas, while preserving current opportunities for fishing; alternative C.10 was designed to mitigate the impacts of no-trawl zones through a vessel and permit buyback system; and alternative C.12 was constructed in a manner that took into account current fishing patterns, and proposed closing areas that weren’t trawled on a consistent basis.

These alternatives helped inform the process as well as the extensive comments received. For example these comments included the following:

Public Comment Received From Organizations

- Oceana (Modified Alternative C.12)
- Coastside Fishing Club
- California Coastal Commission
- Moss Landing Harbor District
- California Lobster and Trap Fishermen's Association
- Mendonoma Marine Life Conservancy
- Coos Bay Trawler' Association, Inc.
- Port of Bandon
- Oregon Anglers
- Rouge Valley Audubon Society
- Audubon Society of Portland
- City of Morro Bay
- Natural Resources Defense Council/Oceania/The Ocean Conservancy
- Southern California Trawlers Association
- Fishing Vessel Owners' Association, Inc.
- Pacific Marine Conservation Council
- Natural Resources Defense Council/The Ocean Conservancy
- California Artificial Reef Enhancement Program
- Pacific Marine Conservation Council–Independent Scientific Review Panel
- Fishermen's Marketing Association (Trawl Industry Proposal)

This process included the development of alternatives by the trawl community (Fishermen's Marketing Association-Trawl Industry Proposal) and by the environmental community (Oceana-Modified Alternative C.12). These alternatives were then used by representatives of each of the three states who also held public meetings in addition to the Pacific Fishery Management Council meetings to develop the preferred alternative (discussed below) which is a blend of achieving the objectives of these groups and of the states. In developing their respective component of the preferred alternative, each State process reflected the balancing of impacts on the trawl fleets, the effects of effort shift into other areas, environmental, community, and fishery management and enforcement objectives. For example, the Washington State proposal made explicit reference to making sure that less than 5% of trawl revenues would be displaced from proposed closed areas. Note that C10 is predicated on a privately funded buyback program, and is an alternative that was supported by the Council. Due to industry negotiations, this alternative was not in final enough form for implementation. Should these negotiations become successful, the Council will consider implementing this alternative. Some alternatives were viewed as having too high an economic impact such as Alternative C.2 which would have led to closing the entire West coast Dungeness crab fishery.

2.3 EFH Preferred Alternative (Proposed Rule)

The preferred alternative to minimize fishing impacts to EFH is the focus of this RIR. EIS Chapter 2 contains a complete and detailed explanation of all the alternatives, and the EIS appendices display charts showing the affected geographic area under each fishing impact minimization alternative.

Elements of the Council-preferred alternative include:

- Identification of groundfish EFH as waters and associated sea bottom in depths less than 3,500 meters. Seamounts at depths greater than 3,500 meters will also be identified as groundfish EFH.
- Designation of a range of habitat types and specified areas as habitat areas of particular concern (HAPC). HAPCs provide focus when NMFS consults with other federal agencies on the impacts of activities they undertake or permit in groundfish EFH areas.
- Closing large areas of the West Coast exclusive economic zone (EEZ) to specified fishing gear, including closing all areas deeper than 700 fathoms to bottom trawl gear. Additional ecologically important areas within 700 fathoms will be closed to specified gear types.
- Prohibitions on the use of specified gear to minimize impacts to EFH.
- Support for habitat-related monitoring and research.

2.4 Reason for Considering the Proposed Action

The purpose of this action is to determine whether and how to amend the Council FMPs pursuant to section 307(a) of the Magnuson-Stevens Act. More specifically, the three-part purpose of this action is to analyze for each fishery a range of potential alternatives to 1) identify and describe EFH for managed species, 2) identify HAPC, and 3) identify measures to minimize to the extent practicable the adverse effects of fishing on EFH (see also EIS Chapter 1, Purpose and Need for Action).

2.5 Objectives of, and Legal Basis for, the Proposed Action

The description and identification of EFH and HAPCs would not in and of itself have any direct environmental and/or socioeconomic impacts. The requirement to minimize the adverse effects of fishing on EFH would, however, likely result in environmental and/or socioeconomic impacts. Therefore, the effects of these alternatives on small entities need to be evaluated. The objective of the action is to minimize, to the extent practicable, adverse effects on EFH caused by fishing, per the EFH requirements of the Magnuson-Stevens Act section 303(a)(7) and the regulatory guidelines developed by NMFS in accordance with section 305(b)(1)(A).

2.6 Final Preferred Alternative:

The component of the final preferred alternative intended to minimize the adverse effects of fishing on groundfish EFH comprises management measures in three categories: (1) gear modifications, (2) closed areas, and (3) promotion of reductions in fishing effort.

Gear Modifications and Prohibitions

The preferred alternative includes the following gear modifications and prohibitions:

- Prohibit bottom trawl roller gear with a footrope diameter greater than 19 inches on bottom trawl gear throughout the EEZ.
- Prohibit bottom trawl roller gear with a footrope diameter greater than eight inches eastward of a line approximating the 100 fathom depth contour.
- Prohibit dredge gear seaward of the shoreline.
- Prohibit beam trawl gear seaward of the shoreline.

Counterpart restrictions in state waters will be implemented by state law, as appropriate. Although dependent on state regulation, the restrictions on dredge and beam trawl gear are not intended to apply in internal waters (Puget Sound, San Francisco Bay, etc.).

Closed Areas

The final preferred alternative contains two types of closed areas: a “trawl footprint” closure and ecologically important closed areas.

Footprint Closure: Under this component of the final preferred alternative, areas that were not trawled from 2000 to 2003 would be permanently closed to bottom trawl. The final preferred alternative closes depths within the EEZ greater than 700 fathoms to bottom trawl.

Ecologically Important Closed Areas: This component of the preferred alternative includes area specific fishery closures as described below (a map of the closed areas is available in the FEIS for Pacific Coast Groundfish EFH).

1. The following areas off Washington will be closed to bottom trawl gear: Olympic 2; Biogenic 1; Biogenic 2; Grays Canyon; and, Biogenic 3.
2. The following areas off Oregon will be closed to bottom trawl gear: Nehalem Bank/Shale Pile; Astoria Canyon; Siletz Deepwater; Daisy Bank/Nelson Island; Newport Rockpile / Stonewall Bank, Heceta Bank, Deepwater off Coos Bay, Bandon High Spot, Rogue Canyon.
3. The following areas off California will be closed to bottom trawl gear other than Scottish Seine: Eel River Canyon; Blunts Reef; Mendocino Ridge; Delgada Canyon; Tolo Bank; Point Arena Offshore; Outer Cordell Bank; Biogenic Area 12; Farallon Islands / Fanny Shoal; Half Moon Bay; Monterey Bay / Canyon; Point Sur Deep; TNC/ED Area 2; TNC/ED Area 1; TNC/ED Area 3; Potato Bank; Cherry Bank; Hidden Reef / Kidney Bank; Catalina Island; and, the Cowcod Conservation Area East.
4. The following areas within the EEZ will be closed to all bottom contact gear: Thompson Seamount; President Jackson Seamount; Inner Cordell Bank; Anacapa Island SMR; Anacapa Island SMCA; Carrington Point; Footprint; Gull Island; Harris Point; Judith Rock; Painted Cave; Richardson Rock; Santa Barbara; Scorpion; Skunk Point; and, South Point.
5. The following area will be closed to any gear that is deployed deeper than 500 fathoms: Davidson Seamount.

Effort Reduction

The final preferred alternative incorporates *the* possibility of future implementation of Alternative C.10 involving public-private partnerships under which private funds are used to purchase groundfish limited

entry trawl licenses by adding language to the FMP by amendment. The proposed language notes the Council will support such efforts, as feasible, through their consideration of actions upon which the execution of contracts may be contingent.

Research and Monitoring

Elements of Alternatives D.2-D.4, addressing EFH-related research and monitoring were incorporated into the final preferred alternative, although these elements will not be implemented as part of the proposed action evaluated in this EIS. Rather, they are identified as programmatic elements, either expressing priorities and objectives (expansion of the logbook program, research reserves) or identifying another process as the vehicle for implementation (expansion of VMS).

Expanded Logbook Program: The preferred alternative would amend the groundfish FMP to indicate Council support for an expanded logbook program, to the degree practicable (modification of Alternative D.2).

Expanded Vessel Monitoring System: Expansion of the current Vessel Monitoring System (VMS) program currently is being considered by the Council as part of a separate action. Under that action the Council has been considering expanding the VMS requirement to a range of trawl and nontrawl fisheries (including all bottom trawl vessels), to support EFH conservation objectives. However, for purposes of aiding the enforcement of the EFH related areas, the preferred alternative includes the requirement that all bottom trawl vessels carry VMS.

Research on the Impacts and Results of Bottom Trawl Closed Areas: The preferred alternative makes focusing research on the impacts and results of closing areas to bottom trawl a Council priority (modification of Alternative D.4).

3 Description of the Baseline Environment

This section describes baseline conditions relevant to the requirements of the RIR/IRFA/Practicability Analyses.

3.1 Description of Biological and Ecosystem Conditions

Eight groundfish stocks are currently declared overfished and subject to rebuilding plans.¹ They are: bocaccio (*Sebastes levis*), cowcod (*S. levis*), canary rockfish (*S. pinniger*), darkblotched rockfish (*S. crameri*), Pacific ocean perch (*S. alutus*), widow rockfish (*S. entomelas*), yelloweye rockfish (*S. ruberimus*), and lingcod (*Ophiodon elongates*). The need to rebuild these stocks has had a major effect on the groundfish management regime. Many groundfish species co-occur, making it difficult or impossible for fishermen to completely avoid the overfished species while targeting healthy stocks. The very low OYs that have to be set for some overfished species therefore act to constrain fishing opportunity for healthy stocks. Furthermore, because the eight overfished species occur across a range of depths, geographic regions, and habitats, diverse West Coast fisheries, from large catcher-processors targeting Pacific whiting to recreational anglers up and down the coast, are subject to overfished species protection constraints. Historically, the main tool for managing commercial groundfish catches has been landing limits. In their current form these cumulative landing limits set the amount of a species or a mix of

¹ The rebuilding plans for these eight species are found in section 4.5.4 of the FMP. Implementing regulations are at 50 CFR 660.365.

species that may be landed in a two-month period. While these limits are based on landings, or the amount of fish brought to the dock, total catch must be accounted for when determining whether there is a risk of an OY being breached. At the same time, once fishermen have reached the landing limit for a species, they have an incentive to discard fish at sea so that they may continue landing other species. These at-sea discards, or bycatch, have become a focus of management, both to better monitor the amount and institute measures to reduce it.

NMFS and the Council use a three-part strategy to meet Magnuson-Stevens Act mandates on bycatch monitoring and minimization: (1) gather data through a standardized reporting methodology on the amount and type of bycatch occurring in the fishery; (2) assess these data through bycatch models to estimate when, where, and with which gear types bycatch of varying species occurs; and (3) implement management measures through Federal fisheries regulations that minimize bycatch and bycatch mortality to the extent practicable, and that keep the total mortality of groundfish within the OYs of the various groundfish species and species groups.

NMFS uses the West Coast groundfish observer program (WCGOP) established in August 2001 and required in the FMP in Section 6.5.1.2, as its primary standardized reporting methodology for bycatch in the groundfish fisheries. The WCGOP focuses on vessels participating in the shore-delivery cumulative limit fisheries for non-whiting groundfish. Although WCGOP deploys observers on vessels of all major gear types, the program initially focused on observing trawl vessel fishing activity. As WCGOP has developed, it has expanded into more observations in the limited entry nontrawl fleet. About 75 percent of WCGOP's observer hours tend to be spent on trawl vessels, with the remaining 25 percent primarily focused on limited entry longline and pot vessels. Through 2003, NMFS's observer coverage of the limited entry fixed gear fleet focused on vessels participating in the primary sablefish fishery. Beginning in 2004, the agency began adding observer coverage to the remainder of limited entry fixed gear fishing strategies and to the open access directed groundfish fisheries. Vessels participating in the at-sea whiting fisheries (catcher-processors and motherships) have been voluntarily carrying observers since 1991, although these vessels are now required to do so under federal regulations at 50 CFR 660.314. The WCGOP and the whiting observer programs, in combination with state fish ticket and logbook programs and fisheries-independent data, are used to support groundfish bycatch assessment models. In addition to these Federal programs, the Council relies on state recreational fisheries sampling programs, which use a combination of at-sea and at-dock samplers to gather catch and discard data on the recreational fisheries.

NMFS and the Council use data on bycatch and discard in models intended to estimate the amount and type of bycatch occurring in the groundfish fisheries. NMFS first introduced a groundfish fisheries total catch assessment model (known as "the bycatch model") in late 2001 for the 2002 fishing season. As the WCGOP has evolved, so has the bycatch model. During its first year, the bycatch model focused on overfished species taken incidentally in the trawl fisheries, and was populated with data from observation experiments from the mid-1990s and prior years. By January 2003, NMFS had analyzed data from the first year of the WCGOP and the bycatch models for fishing years 2003 and 2004 were updated with WCGOP-generated data. Prior to 2004, the bycatch model had focused on co-occurrence ratios for overfished species taken in target species fisheries without also looking at potential discard of target species. For the 2004 fishing year, NMFS expanded the bycatch model to set discard rates for target species by depth. Like initial WCGOP efforts, the models for the 2002-2003 fishing years also focused on the trawl fisheries. For 2005-2006, NMFS has again updated the trawl bycatch model with trawl fisheries data from WCGOP. NMFS has also revised the new fixed gear bycatch model, initially used in 2004, for the 2005-2006 fisheries that uses observer data from the limited entry fixed gear fisheries.

The third part of the NMFS and Council bycatch reduction strategy is a series of management programs intended to either directly control fishing activities or to create incentives for bycatch reduction. NMFS has implemented a wide array of fishery management measures intended to minimize bycatch and

bycatch mortality over the past several years. The agency has supported a series of state-sponsored exempted fishing permit (EFP) programs to test bycatch-reducing gear types, full retention programs, and area closures. Working with the states and the Council, NMFS has also implemented shorter-than-year-round fishing seasons for various species and sectors of the groundfish fleet to protect overfished groundfish species. NMFS and the Council have also reduced overcapacity in the fleets, ultimately reducing the number of vessels on the water. Amendment 14 to the FMP implemented a permit stacking program for the limited entry fixed gear fleet that reduced the number of vessels participating in the primary sablefish fishery by about 40 percent. In late 2003, NMFS implemented a buyback of limited entry trawl vessels and their permits, reducing the groundfish trawl fleet by about 35 percent. Since 2000, NMFS has required gear modifications that restrict the use of trawl gear in rockier habitat coastwide, and that constrain the catching capacity of recreational fishing gear off California. Higher groundfish landings limits have been made available for trawl vessels using gear or operating in areas where overfished species are less likely to be taken. Species-to-species landings limit ratios have been thoroughly examined in the bycatch model mentioned earlier, and are re-examined each year as new observer program data become available. As an additional tool to manage overfished species bycatch, NMFS has implemented a suite of areas that are closed to specific types of fishing known collectively as the Rockfish Conservation Areas (RCAs).

The status of habitat conditions are unknown as is the extent such conditions influence ecosystem conditions and biological productivity. Each of the habitat types on the West Coast probably react differently to different fishing gear types and the intensity of impact and have unique rates of recovery. The status of habitat is a balance in how the habitat was affected by an impact and how much recovery takes place between impacts. Although it is not possible at this time to understand the status of habitat, it is clear that fishing can have adverse impacts to habitat that can impair the ability of fish to carry out basic biological functions such as spawning, feeding, breeding, and growth to maturity. Fish, like all organisms, rely on habitat for their survival. The habitat requirements of many fish change depending on the life history stage. Pacific coast rockfish, for example, spend their early life history as eggs and larvae floating in the water column before settling as juveniles on the substrate, where they grow to maturity and reproduce. Although it cannot be quantified, healthy functioning habitat is critical for populations of fish to sustain themselves and there is a level at which adverse impacts to habitat will impair the ability of fish to do so.

Large-scale modification to habitat may have long-lasting or permanent implications at the scale of the ecosystem. Benthic and pelagic habitats are fundamental components of the ecosystems off the West Coast as are the fish and other organisms that rely on them. It follows that large-scale modification to habitat can result in fundamental change to the ecosystem. For example, if a complex habitat that supports reproduction of a species is modified to the point that the species can no longer reproduce successfully there, and the species is unable to adapt and reproduce elsewhere, the survival of the species and its role in the ecosystem would be threatened. The extent of the threat would depend on the extent of the modification (e.g., is all of the habitat non-functional or just a portion?), and the related ability of the habitat to recover and/or the species to adapt to alternative habitats. Some habitats may take a long time to recover or may reach an alternative stable state from which a return to its former state is highly unlikely, even following a complete removal of impacts and thus evolve into a new role in the ecosystem. A complete discussion of the best available information on habitat and its role in groundfish productivity and the ecosystem is contained in the Final Environmental Impact Statement for this action.

3.2 Description of the Fisheries

Commercial, tribal, and recreational fishermen harvest over 89 species of groundfish managed under the Pacific Groundfish FMP off the coasts of Washington, Oregon, and California. Two of the FMP's objectives affect the management of other West Coast fisheries in addition to the management of groundfish: 1) maintaining year-round groundfish fishing and 2) reducing bycatch of the eight overfished groundfish species within the groundfish fishery and in other fisheries. These other fisheries include salmon, highly migratory species, coastal pelagic species, shrimp, and crab, amongst others. West Coast fishermen often participate in several of these fisheries throughout the year. All of these fisheries contribute to a wide range of commercial, recreational, and tribal activities that have economic, social, and cultural significance to those engaged in harvesting fish resources. Fish buyers and processors, suppliers of commercial and recreational fishing equipment and services, and fishing communities depend on these fisheries.

Active participation in West Coast shore-based commercial fisheries has generally declined over the years 2000 to 2003. In 2003, 1,511 vessels landed West Coast groundfish, 314 landed coastal pelagic species, 1,288 landed crab, 1,034 landed highly migratory species, 1,203 landed salmon, and 215 landed shrimp. In 2003, coastal pelagic species accounted for 33% of all landings by weight, crab 10%, groundfish 23%, shellfish 17%, shrimp 4%, highly migratory species, 5%, salmon 6%, and other species accounted for 3% (not including at-sea activity).

Table 1 Count of Vessels Making Landings by Species Group

Species Group	2000	2001	2002	2003
Coastal Pelagic	487	381	355	314
Crab	1,387	1,239	1,311	1,288
Groundfish	1,993	1,800	1,619	1,511
Highly Migratory	958	1,116	875	1,034
Other	1,624	1,642	1,558	1,404
Salmon	1,255	1,265	1,271	1,203
Shellfish	110	95	228	81
Shrimp	328	301	296	215
Total Unique Vessels	4,276	4,010	4,020	3,811

Source: PacFIN FT and FTL tables. July 2005

The FMP classifies commercial activities as either limited entry, open access, or tribal. Under authority of the FMP, NOAA Fisheries has issued limited entry permits since 1994 for commercial groundfish fishing vessels to control the capacity of the groundfish fishing fleet by limiting the number of fishing vessels, limiting the number of vessels using each of the three major gear types (trawl, trap/pot, longline), and limiting increases in harvest capacity by limiting vessel length. Open access fisheries may catch and land groundfish. Open access trawl gear may not target groundfish, but may land incidental groundfish caught while targeting other species. Open access trap/pot and longline vessels may target groundfish under certain restrictions. Open access vessels may possess limited entry licenses for other, state-managed nongroundfish fisheries such as pink shrimp or Dungeness crab. The Council allocates harvest limits (expressed as optimum yields, or OYs) among different regulatory and fishery sectors, including limited entry and open access fisheries, with the majority of groundfish allocated to the limited entry sector. Indian tribes in Washington, primarily the Makah, Quileute, and Quinault, have treaty rights to harvest Pacific groundfish. NOAA Fisheries will implement the rights either through an allocation of fish that

will be managed by the tribes, or through federal groundfish regulations that will apply specifically to the tribal fisheries.

Marine recreational fisheries consist of charter vessels, private vessels, and shore anglers. Charter vessels are larger vessels for hire, which typically can fish farther offshore than most vessels in the private recreational fleet. Shore-based anglers often fish in intertidal areas, within the surf, or off jetties. Fishing opportunity both in nearshore areas and farther out on the continental shelf are important for West Coast recreational fishermen. (According to Pacific States Marine Fisheries Recreational Fishery Information Network [RecFIN], there are virtually no records of recreationally caught continental slope species; thus, recreational groundfish fishing occurs almost exclusively along the continental shelf or nearshore). Recreational fishers targeting nongroundfish species such as tuna and billfish may travel longer distances, even to areas outside the U.S. EEZ.

3.2.1 Commercial Fisheries

Commercial fisheries make up the largest portion of West Coast landed catch by weight. Coastal pelagic species, followed by groundfish, crab, and highly migratory species have made up the largest landings by weight since 2000. Crab, followed by groundfish, coastal pelagic species, and highly migratory species comprise the highest-value groups from 2000–2003. The four largest gear groups by weight have been gill and trammel net, trawl, trap/pot, and troll gear.

Table 2. Shoreside Landings and Exvessel Revenue by Species Category and Year

		Year			
Species Group	Data type	2000	2001	2002	2003
Coastal Pelagic Species	Landed weight (lbs)	498,232,740	431,544,771	403,146,744	266,368,388
	Exvessel Revenue (\$)	42,069,760	32,494,118	32,732,787	33,824,432
Crab	Landed weight (lbs)	30,562,479	26,645,343	37,156,344	75,126,504
	Exvessel Revenue (\$)	64,575,735	54,017,788	62,570,332	118,393,209
Groundfish	Landed weight (lbs)	268,754,713	226,402,046	164,010,829	180,765,829
	Exvessel Revenue (\$)	62,689,248	52,034,893	43,438,224	48,945,438
Highly Migratory Species	Landed weight (lbs)	23,217,661	27,365,996	23,269,259	38,071,415
	Exvessel Revenue (\$)	22,790,849	24,253,397	17,256,645	28,126,563
Other	Landed weight (lbs)	21,579,099	19,705,423	20,890,419	16,868,699
	Exvessel Revenue (\$)	27,123,067	23,982,459	23,098,380	20,616,940
Salmon	Landed weight (lbs)	7,122,757	6,458,681	9,790,983	11,493,417
	Exvessel Revenue (\$)	13,962,096	10,605,885	14,345,088	20,959,564
Shellfish	Landed weight (lbs)	18,101,109	18,552,442	27,117,595	26,746,585
	Exvessel Revenue (\$)	45,577,879	44,101,002	61,294,480	69,678,867
Shrimp	Landed weight (lbs)	35,906,296	40,960,953	57,818,606	32,160,356
	Exvessel Revenue (\$)	20,543,414	16,753,777	21,407,954	11,479,887
Total Landed weight (lbs)		903,476,854	797,635,655	743,200,779	647,601,193
Total Exvessel Revenue (\$)		299,332,048	258,243,320	276,143,890	352,024,899

Source: PacFIN ftl table. August 2004

Note: Data shown is for PFMC management areas and does not include inside waters such as Puget Sound and Columbia River.

Table 3. Shoreside Landings and Revenue by Gear Type and Year

		Year			
Gear	Data type	2000	2001	2002	2003
Dredge	Landed weight (lbs)			C	
	Exvessel Revenue (\$)			C	
Hook and Line	Landed weight (lbs)	11,802,585	11,020,956	12,614,636	10,825,355
	Exvessel Revenue (\$)	20,935,838	19,225,187	17,679,231	19,776,877
Misc	Landed weight (lbs)	35,380,715	33,635,105	42,904,188	38,561,396
	Exvessel Revenue (\$)	62,944,925	58,034,808	74,019,410	79,445,478
Net	Landed weight (lbs)	502,470,237	435,111,623	406,345,771	268,877,740
	Exvessel Revenue (\$)	48,226,898	36,665,962	36,382,949	36,919,258
Pot	Landed weight (lbs)	33,746,129	29,263,663	39,942,815	78,765,977
	Exvessel Revenue (\$)	75,724,736	64,286,487	71,891,553	129,824,380
Troll	Landed weight (lbs)	25,541,566	28,789,324	27,054,341	45,832,676
	Exvessel Revenue (\$)	29,247,312	29,245,055	25,667,562	43,931,473
Trawl	Landed weight (lbs)	259,658,663	220,003,436	157,474,652	173,261,044
	Exvessel Revenue (\$)	43,868,230	36,547,531	31,428,967	33,034,613
Shrimp Trawl	Landed weight (lbs)	34,876,959	39,811,548	56,862,974	31,477,005
	Exvessel Revenue (\$)	18,384,109	14,238,290	19,072,882	9,092,821
Total Landed weight (lbs)		903,476,854	797,635,655	743,199,377*	647,601,193
Total Exvessel Revenue (\$)		299,332,048	258,243,320	276,142,553*	352,024,899

Source: PacFIN ftl table. August 2004

Note: Data shown is for PFMC management areas only and does not include areas such as Puget Sound and Columbia River for example.

C means data was restricted due to confidentiality

* totals do not include confidential data

In at least some sectors of the west coast commercial fishing industry, the age of fishermen has been increasing, and there are very few new entrants into the fishery (McKorkle, 2005. public comment; Port of San Luis, 2005. public testimony). This trend has been blamed on lost economic opportunities and increasing restrictions in some existing fisheries. As current fishers retire, future repercussions may occur as a result of lost knowledge of the fishery, and fewer fishermen prosecuting the fishery. Fewer fishermen participating in the fishery may result in less demand for support services and lower catch on a regional or total basis. Reduced catch may have secondary impacts to processors which purchase from these fishers, and tertiary effects to consumers that purchase those seafood products.

Limited Entry Groundfish Trawl Sector

West Coast limited entry trawl vessels use midwater trawl gear, and small and large footrope bottom trawl gear (defined at 50 CFR 660.302 and 660.322(b)) (See Section 3.5.1). Midwater trawl gear is not designed to touch the ocean bottom and is therefore used to target groundfish species—such as Pacific whiting and yellowtail rockfish—that ascend above the ocean floor. Small and large footrope trawl gear are designed to remain in contact with the ocean floor and are used to target species that reside along the ocean bottom such as flatfish on the continental shelf and slope, or DTS species (dover sole, thornyhead and sablefish complex) in deep water. Fishers generally use small footrope trawl gear in areas that have a regular substrate—few rocks or outcroppings—and more widely on the continental shelf than on the continental slope (due in large part to regulatory requirements). Fishers use large footrope trawl gear most commonly in areas that may have an irregular substrate, and along the continental slope and in deeper water.

The limited-entry shore-based trawl vessels primarily deliver their catch to processors and buyers located along the coasts of Washington, Oregon, and California, and tend to have their homeports located in towns within the same general area where they make deliveries. Larger vessels in the shore-based limited entry trawl sector focus more heavily on the DTS complex in deep water, while smaller trawl vessels focus more heavily on the shelf. Large trawl vessels also tend to participate in the trawl fishery for more months of the year than small trawl vessels. The shore-based vessels range in size from less than 40 feet to over 90 feet in length (Table 4).

Table 4. Count of Limited Entry Trawl Vessels Making Landings by State, Year, and Vessel Length

State	YEAR	Vessel Length (feet)						
		0–40	41 - 50	51 - 60	61 - 70	71 - 80	81 - 90	> 90
CA	2000	1	13	24	20	18	6	2
	2001	4	10	16	15	12	7	1
	2002	2	5	5	8	12	3	0
	2003	3	8	8	4	5	1	0
OR	2000	1	3	21	35	30	15	7
	2001	2	7	19	34	31	13	3
	2002	2	5	17	32	29	14	3
	2003	2	5	17	33	28	15	3
WA	2000	0	3	5	5	10	4	3
	2001	0	5	5	4	12	3	1
	2002	0	2	6	3	8	4	1
	2003	0	1	2	4	9	3	1

Source: PacFIN ftl and cg tables. July 2004

In addition to the shore-based limited entry trawl fishery, an at-sea limited entry trawl fishery exists off the coast of Washington, Oregon, and California. The high-volume at-sea fishery targets Pacific whiting with the use of midwater trawls. Pacific whiting commands a relatively low price per pound in the market place. The limited entry at-sea sector is made up of a catcher-processor fleet and a mothership/catcher vessel fleet. A catcher-processor participates in both catching and processing; a mothership engages only in the processing of a particular catch, and relies on catch made by catcher vessels. Many of the catcher vessels that deliver to the West Coast mothership sector may also fish as West Coast shore-based trawl

vessels outside the Pacific whiting season; other catcher vessels fish in West Coast waters only during Pacific whiting fishery and return to North Pacific fisheries when the Pacific whiting season closes.

According to PacFIN data, the at-sea sector annually catches over 100 million pounds of Pacific whiting, as well as several hundred thousand pounds of other types of West Coast groundfish (Table 5). Unfortunately, readily available data do not exist for estimating the value of at-sea activities.

Table 5. At - Sea Sector Catch by Year, Species Aggregation, and Sector (Units are in pounds)

Species Aggregation	At - Sea Sector	2000	2001	2002	2003
Non-Whiting Groundfish	Catcher/Processor	1,227,955	869,326	532,717	230,094
	Non - Tribal Mothership	1,188,862	427,932	69,445	13,610
Pacific Whiting	Catcher/Processor	149,505,480	129,251,616	80,119,007	90,862,066
	Non - Tribal Mothership	103,265,104	78,976,106	58,628,095	57,367,288

Source: PacFIN NPAC4900 table. February 2004

The Limited Entry Trawl Capacity Reduction Program

In 2003, a fishing capacity reduction program (buyback) was implemented off the Pacific coast which retired 91 vessels from the limited entry trawl sector. These 91 vessels represented less than 40 percent of the number of boats actively engaged in the limited entry trawl sector, but approximately 50 percent of historic catch. The purpose of the program was to reduce the number of vessels and permits endorsed for the operation of groundfish trawl gear in order to increase and stabilize economic revenues for vessels remaining in the groundfish fishery and conserve and manage depleted groundfish species. Vessels that participated in the buyback program were sold, scrapped, or converted to nonfishing purposes, and those vessels cannot be used for fishing again.

The impact of the trawl vessel buyback appears to have been positive in terms of exvessel revenue per vessel. Average trawl exvessel revenues generated by non-Pacific Hake groundfish increased from approximately \$108,000 to \$151,000 in the years 2003 to 2004 respectively even though total exvessel revenues for the fleet decreased from approximately \$25,000,000 to \$22,000,000 during the same period. (Note that the decline in fleet revenues was not the result of the buyback but due, rather, to changes in management, Optimum Yields and market prices.)

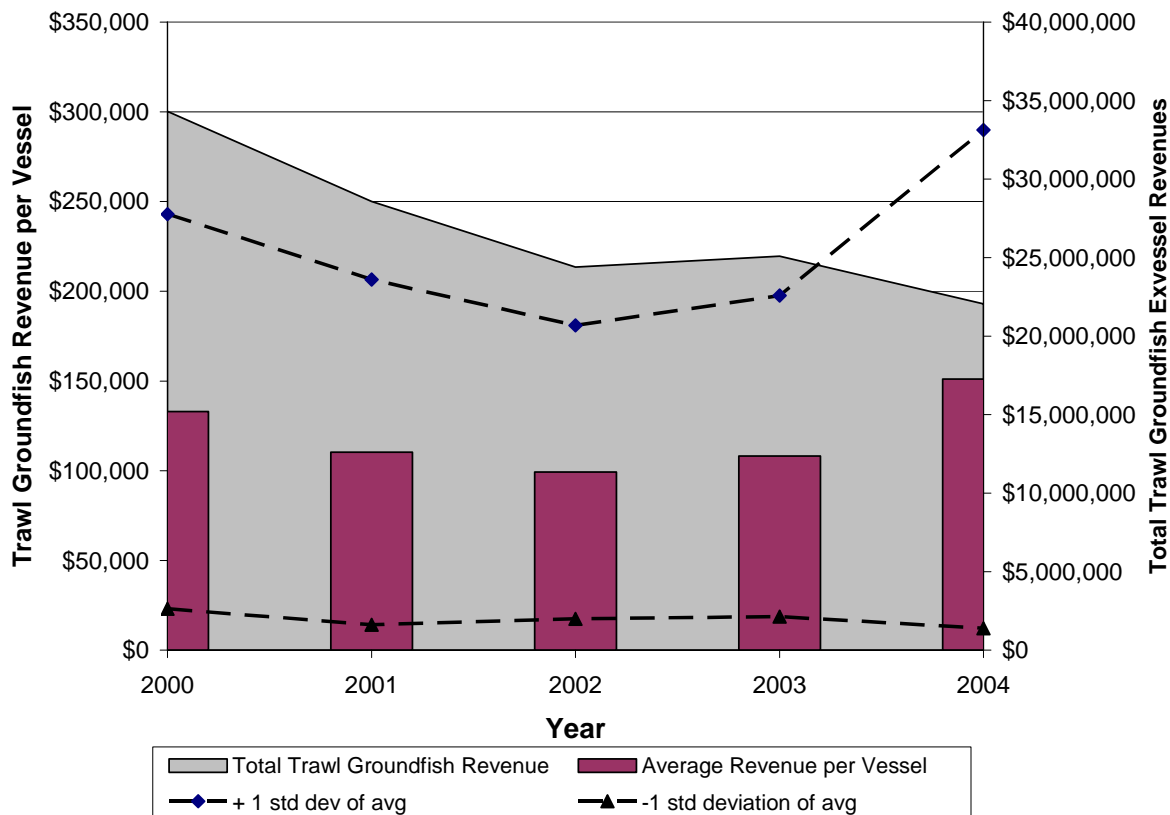


Figure 1. Annual Trawl Vessel Revenues per Year where the Catch is Non-Hake Groundfish

The impact of the trawl vessel buyback differed by region. Some ports lost a disproportionate share of their trawl fleet, while others lost relatively few trawl vessels.

Table 6. Count of Trawl Vessels Landing Non-Hake Groundfish by Port and Year

PORT	2000	2001	2002	2003	2004
ASTORIA	54	48	41	44	32
AVILA	13	15	16	13	7
BELLINGHAM BAY	7	16	6	9	6
BROOKINGS	11	11	11	13	8
CHARLESTON (COOS BAY)	30	30	25	28	21
CRESCENT CITY	26	21	24	19	4
EUREKA	27	32	30	28	15
FIELDS LANDING	15	14			
FORT BRAGG	17	19	29	14	11
MONTEREY	5	4	5	5	3
MORRO BAY	17	10	11	10	10
MOSS LANDING	16	15	14	16	16
NEAH BAY	11	11	5	8	5
NEWPORT	41	41	31	33	27
PORT ANGELES	7	8	10		5
PRINCETON / HALF MOON BAY	14	14	12	11	12
SAN FRANCISCO	26	18	17	12	10
SANTA BARBARA	5	14	14	8	4
SANTA CRUZ	6	5	6	6	4
VENTURA	5	7	10	8	3
WESTPORT	19	11	10	9	9

Note: ports with fewer than three trawl vessels in any year were excluded for confidentiality purposes

Source: PacFIN ft and ftl tables

By weight, some ports appear to have lost relatively more groundfish catch than other ports. Not surprisingly, those ports that lost relatively more trawl vessels also appear to have lost relatively more catch of groundfish.

Table 7. Landed Weight of Non-Hake Groundfish made by Trawl Vessels by Port and Year (lbs)

PORT	2000	2001	2002	2003	2004
ASTORIA	15,733,074	12,128,458	8,265,559	9,742,986	11,691,379
AVILA	834,680	616,016	1,563,590	1,542,126	982,240
BELLINGHAM BAY	5,567,902	4,250,213	5,239,046	4,971,017	3,356,161
BROOKINGS	2,564,206	1,942,570	1,263,150	1,973,492	1,070,491
CHARLESTON (COOS BAY)	8,753,192	6,613,222	4,692,898	6,261,152	5,307,643
CRESCENT CITY	2,867,758	2,613,821	2,789,286	1,903,833	1,089,460
EUREKA	4,113,867	4,065,846	3,905,964	4,373,074	3,696,474
FIELDS LANDING	2,448,302	1,241,606			
FORT BRAGG	4,055,532	3,429,009	4,506,717	3,028,961	2,902,846
MONTEREY	862,084	692,836	573,330	547,952	409,290
MORRO BAY	285,861	195,718	167,050	248,413	777,682
MOSS LANDING	1,350,408	1,321,558	1,447,451	2,039,384	1,138,278
NEAH BAY	2,332,979	1,422,344	36,017	1,906,337	616,595
NEWPORT	7,918,289	5,823,743	4,023,203	4,997,183	4,414,402
PORT ANGELES	170,573	80,998	2,550,679		396,169
PRINCETON / HALF MOON BAY	1,537,386	1,210,273	927,221	651,677	561,930
SAN FRANCISCO	2,067,686	1,677,797	1,294,075	1,311,881	1,820,147
SANTA BARBARA	10,314	6,514	12,914	965	8,356
SANTA CRUZ	100,694	58,211	25,959	10,172	4,524
VENTURA	1,785	4,680	3,131	683	344
WESTPORT	1,803,584	1,873,952	9,075,180	1,032,300	1,006,859

Note: ports with fewer than three trawl vessels in any year were excluded for confidentiality purposes

Source: PacFIN fit and fitl tables

Distribution of Effort by Limited Entry Groundfish Trawl Vessels

Limited entry trawl vessels focus much of their effort on DTS species along the slope, flatfish species along the shelf, and Pacific whiting above the seafloor. Historically, much effort was focused on rockfish species, but recent regulatory requirements—such as RCAs and various cumulative limits - have curtailed rockfish opportunities to protect overfished stocks. In 2005, a specific small footrope trawl designed to avoid rockfish (the selective flatfish trawl) will work to further avoid the catch of rockfish along the shelf while increasing opportunities for flatfish north of 40° 10' latitude. Opportunities to harvest DTS and flatfish species—largely in the form of differential cumulative limits and RCAs—dictate the location of much of the trawl effort, though not all effort is dictated by regulation. Vessels differ in size and technical capacity. For example, small vessels may find it more difficult to fish during the winter months because of weather and other vessels may not have the capacity to fish in deep water where DTS species primarily reside. In other cases, some vessel captains may be more knowledgeable and more successful in certain areas. This knowledge would also influence the location and timing of effort by certain vessels. Furthermore, some species are known to migrate and aggregate during certain months of the year. For example, Petrale and Dover sole are known to aggregate for spawning during the winter months, and

several types of flatfish are known to migrate onto the shelf during the summer months. Fishers may target the location of their efforts according to species aggregations and the tendencies of certain fish species to migrate. Differences in knowledge, capital constraint, fish migration, and the regulatory environment can—in large part—affect the location and time of effort by commercial fishing vessels.

Table 8 shows the depth-based annual distribution of catch made by non-shrimp trawl vessels and Table 9 shows the monthly distribution of catch as recorded in trawl logbook data within PacFIN. These data include bottom trawl and midwater trawl gear.

Table 8. Depth Based Distribution of Landed Groundfish Catch by Limited Entry Trawl Vessels Using Midwater or Bottom Trawl Gear (Pounds by Year and Depth Range)

Depth Range (fathoms)	2001	2002	2003
0-50	22,930,260	40,048,627	15,919,762
51-100	215,155,125	158,543,798	135,411,711
101-150	62,788,477	45,254,962	61,445,691
151-200	13,325,986	7,713,513	18,157,965
201-250	8,322,800	6,198,206	12,817,069
>250	20,664,041	23,096,810	30,265,559

Source: PacFIN logbook data. July 2005

Note: not all logbook records have an associated depth and depth is recorded as the average or start tow depth.

Table 9. Monthly Distribution of Groundfish Landed Catch by Limited Entry Trawl Vessels Using Midwater or Bottom Trawl Gear (Pounds by Month and Year)

Month	Year		
	2001	2002	2003
January	5,280,981	4,051,019	4,589,094
February	6,560,832	5,870,089	5,062,798
March	7,103,004	6,090,047	3,726,461
April	11,361,478	9,881,215	9,423,497
May	13,248,925	11,022,904	10,856,262
June	56,177,784	97,157,431	114,340,896
July	115,519,050	113,615,466	103,952,685
August	89,458,920	20,530,848	13,742,628
September	32,274,454	3,193,638	8,614,816
October	2,661,432	6,597,853	4,965,831
November	3,091,795	4,987,239	4,241,793
December	2,001,895	2,465,965	1,990,757

Source: PacFIN logbook data. July 2005

Landings and Revenues from Groundfish Trawl Vessels

Trawlers catch a wide range of species. By weight, the following species account for the bulk of landings (other than Pacific whiting): Dover sole, arrowtooth flounder, petrale sole, sablefish, thornyheads, and yellowtail rockfish. Management measures intended to reduce the directed and incidental catch of overfished rockfish and other depleted species have significantly reduced rockfish catches in recent years substantially below historical levels.

Table 10. Trawl Shoreside Landings and Exvessel Revenue by State and Year

State	Species Aggregation	Data Type	2000	2001	2002	2003
CA	Non-Whiting Groundfish	Landed weight (lbs)	21,332,461	17,533,624	17,684,047	16,119,987
		Exvessel Revenue (\$)	11,742,269	9,579,192	10,064,667	8,593,528
	Pacific Whiting	Landed weight (lbs)	10,991,151	5,083,027	6,113,247	3,736,459
		Exvessel Revenue (\$)	765,155	171,099	273,550	165,508
OR	Non-Whiting Groundfish	Landed weight (lbs)	35,196,227	26,791,342	18,539,890	22,958,844
		Exvessel Revenue (\$)	17,989,249	14,686,968	10,150,420	12,766,460
	Pacific Whiting	Landed weight (lbs)	151,460,973	117,673,122	71,219,860	80,647,902
		Exvessel Revenue (\$)	6,081,274	4,131,962	3,219,324	3,642,455
WA	Non-Whiting Groundfish	Landed weight (lbs)	12,408,949	11,071,405	19,458,230	11,283,851
		Exvessel Revenue (\$)	4,635,366	4,449,096	4,688,602	4,634,791
	Pacific Whiting	Landed weight (lbs)	26,799,684	39,087,616	23,434,208	37,506,184
		Exvessel Revenue (\$)	1,121,763	1,438,685	1,061,440	1,709,533

Source: PacFIN ftl data. July 2004

Note: Data shown is for PFMC management areas and does not include areas such as Puget Sound and Columbia River for example.

By weight, the vast majority of trawl vessel groundfish is caught with midwater trawl gear. This is due to the fact that Pacific whiting is targeted with midwater trawl gear. In contrast, the majority of trawl exvessel revenues are attributed to the bottom trawl sector (Table 11).

Table 11. Shoreside Trawl Groundfish Landings and Exvessel Revenue by Year, State, and Trawl Type

			YEAR			
Trawl Type	State	Data Type	2000	2001	2002	2003
Bottom Trawl	CA	Landed weight (lbs)	19,450,020	16,461,234	17,468,986	16,097,882
		Exvessel Revenue (\$)	10,837,133	9,067,273	9,956,840	8,586,131
	OR	Landed weight (lbs)	25,029,598	22,072,494	17,508,908	22,867,904
		Exvessel Revenue (\$)	13,518,662	12,544,088	9,660,636	12,678,106
	WA	Landed weight (lbs)	9,919,916	8,353,238	9,947,471	10,157,735
		Exvessel Revenue (\$)	3,554,208	3,413,438	3,633,637	4,186,790
Midwater Trawl	CA	Landed weight (lbs)	12,873,592	6,155,417	6,328,308	3,758,564
		Exvessel Revenue (\$)	1,670,291	683,018	381,377	172,905
	OR	Landed weight (lbs)	161,627,602	122,391,970	72,250,842	80,738,842
		Exvessel Revenue (\$)	10,551,861	6,274,841	3,709,107	3,730,809
	WA	Landed weight (lbs)	29,288,717	41,805,783	32,944,967	38,632,300
		Exvessel Revenue (\$)	2,202,921	2,474,343	2,116,405	2,157,534
Total Landed Weight			258,189,445	217,240,136	156,449,482	172,253,227
Total Exvessel Revenue			42,335,075	34,457,002	29,458,003	31,512,275

Source: PacFIN FTL table. July 2004

Note: Data shown is for PFMC management areas and does not include areas such as Puget Sound and Columbia River for example.

Limited entry trawlers take the vast majority of the groundfish harvest measured by weight but somewhat less if measured by value. In 2003, groundfish trawlers landed over 95% of total groundfish harvest by weight but only 64% by value (Table 12). The difference in trawl weight and revenue proportions is mostly due to the catch of Pacific whiting. Since whiting are caught almost exclusively by limited entry trawl vessels, they skew the overall value per unit weight calculations for this sector.

Table 12. Shoreside Groundfish Landings and Revenue by Trawl and Non-Trawl Vessels

Gear Group	Data type	2000	2001	2002	2003
Non-Trawl	Landed Weight (lbs)	10,565,268	9,161,910	7,561,347	8,512,602
	Landed Revenue (\$)	20,354,173	17,577,891	13,980,221	17,433,163
Trawl	Landed Weight (lbs)	258,189,445	217,240,136	156,449,482	172,253,227
	Landed Revenue (\$)	42,335,075	34,457,002	29,458,003	31,512,275
Trawl Portion	Landed Weight (lbs)	96%	96%	95%	95%
	Landed Revenue (\$)	68%	66%	68%	64%

Source: PacFIN ftl data. July 2004

Note: Data shown is for PFMC management areas and does not include areas such as Puget Sound and Columbia River for example.

Trawl vessels make most of their landings in Oregon. Newport, Astoria, and Charleston (Coos Bay), Oregon make up three of the largest four ports for landed weight and exvessel revenue during the 2000–2003 period (Table 13). Westport and Ilwaco, WA, Eureka and Crescent City, CA, Brookings, OR, and Bellingham Bay and Neah Bay, WA comprise the remaining top 10 largest ports for trawl vessel landings.

Table 13. Largest Ports for Limited Entry Trawl Vessel Groundfish Landings and Exvessel Revenue (2000–2003)

Rank	Rank by Weight	Rank by Exvessel Revenue
1	NEWPORT	ASTORIA
2	ASTORIA	NEWPORT
3	WESTPORT	CHARLESTON (COOS BAY)
4	CHARLESTON (COOS BAY)	WESTPORT
5	ILWACO	BROOKINGS
6	EUREKA	BELLINGHAM BAY
7	CRESCENT CITY	NEAH BAY
8	BROOKINGS	PRINCETON / HALF MOON BAY
9	BELLINGHAM BAY	EUREKA
10	NEAH BAY	BLAINE
11	FIELDS LANDING	CRESCENT CITY
12	PRINCETON / HALF MOON BAY	ILWACO
13	BLAINE	SAN FRANCISCO
14	SAN FRANCISCO	FIELDS LANDING
15	PORT ANGELES	GARIBALDI (TILLAMOOK)

Source: PacFIN FTL table. July 2004

Limited Entry Groundfish Fixed Gear Sector

West Coast limited entry fixed gear vessels typically use longline and fish pots (traps) for catching groundfish. Groundfish longline activities involve anchoring a stationary line with multiple baited hooks attached to it (groundline) to the ocean floor (See Section 3.5.9.1). A buoy line attaches the groundline to a surface float, usually a buoy and pole. Fishermen leave the longline in the water for several hours to a day. The vessel returns to the gear, retrieves the buoy, and hauls the line to the surface to retrieve the gear and fish.

Fish pots or traps used to harvest groundfish are generally square and have mesh or twine encompassing the exterior. Fishermen drop baited traps to the bottom of the ocean connected to a surface pole or buoy with a vertical line. The fish enter the trap through a door, but cannot exit the trap unless they are small enough to escape through the mesh, or back out the door. These pots are retrieved by the vessel several hours after being set. Both longlines and fish pots can be set across diverse ocean bottom types, though longlines can get hooked on rocky areas or reefs, causing some gear loss.

Limited entry fixed gear fishers typically use shore-based vessels that range in size from 30 feet to 65 feet in length, with some vessels exceeding 100 feet, and some as small as 23 feet (Table 14). Limited entry fixed gear vessels may also participate in open access fisheries or in the limited entry trawl fishery. Like the limited entry trawl fleet, limited entry fixed gear vessels deliver their catch to ports along the Washington, Oregon, and California coast.

Table 14. Count of Limited Entry Vessels Making Landings with Hook and Line or Pot Gear by State, Year, and Vessel Length

State	Year	Vessel Length (feet)						
		< 40	40 - 49	50 - 59	60 - 69	70-79	80 - 89	> 89
CA	2000	23	25	14	2			
	2001	13	28	9	2			
	2002	14	23	10		2		
	2003	14	18	8				
OR	2000	24	46	18	14		1	
	2001	17	31	16	13	1	1	1
	2002	15	19	14	11		1	
	2003	15	21	10	9	1	2	1
WA	2000	11	21	16	5	2	1	
	2001	6	18	13	3	2	1	
	2002	7	14	10	6	2	1	
	2003	7	16	13	5	2	1	

Source: PacFIN FTL table. July 2004

Distribution of Effort by Limited Entry Fixed Gear Vessels

Limited entry fixed gear vessels principally target sablefish, a species that tends to reside in relatively deep water. The limited entry fixed gear sector is subject to rockfish conservation areas; however, the boundaries are somewhat different from those of the limited entry trawl sector. Fixed gear vessels are

more prone than trawl vessels to catching some overfished rockfish species, such as yelloweye rockfish, and are therefore restricted from fishing on the continental shelf. Unfortunately, logbook data showing location and depth of effort for limited entry fixed gear vessels is not readily available. However, the areas of highest sablefish abundance and the boundaries of the fixed gear RCA generally determine the location of limited entry fixed gear effort. The RCA boundaries in July 2004 for limited entry fixed gear have a seaward boundary of approximately 100 fathoms. North of 40° 10' N latitude, the population abundance of sablefish declines notably seaward of 150 fathoms, and is notably higher at 100 fathoms (NMFS 2004, PFMC 2004), meaning that a large amount of limited entry fixed gear effort north of 40° 10' latitude is exerted along depth contours between 100 and 150 fathoms.

Not unexpectedly, this sector has been plagued by overcapacity, although a series of management initiatives have addressed the problem. In the early to mid 1990s, the fully open access (derby) fishery was managed by short seasons of two weeks or less. Two groundfish FMP amendments, Amendment 9, requiring a permit endorsement to participate in the primary sablefish fishery, and Amendment 14, introducing permit stacking, have helped to alleviate the symptoms of overcapacity in the fixed gear sablefish fishery, effectively eliminating the short, derby season. Permit stacking allows up to three sablefish-endorsed permits to be used per vessel. Through a tier system, landing limits vary with the number and type of permits held.

Limited entry fixed gear vessels exert most of their effort during the late spring, summer, and early fall. The monthly distribution of effort has become more spread out over the year, and the number of vessels participating has declined as the tier system and permit stacking provisions were put in place in 1998 and 2001 respectively (Table 14 and Table 15).

Table 15. Limited Entry Vessel Groundfish Landings made with Fixed Gear by Month and Year

Mth	Year							
	2000		2001		2002		2003	
	Landed wt (lbs)	Revenue (\$)	Landed wt (lbs)	Revenue (\$)	Landed wt (lbs)	Revenue (\$)	Landed wt (lbs)	Revenue (\$)
1	67,326	132,487	90,463	119,114	132,364	163,145	112,472	215,344
2	108,890	71,447	152,470	154,001	222,151	169,911	139,408	170,878
3	151,900	141,260	136,058	201,181	317,009	243,697	171,134	214,311
4	256,103	190,067	195,109	198,431	445,992	399,176	357,136	396,859
5	361,945	246,369	310,071	269,816	578,767	763,776	489,877	976,868
6	172,531	211,962	141,985	233,775	373,550	716,493	573,040	1,403,875
7	144,956	265,388	208,843	315,779	336,405	754,497	678,224	1,592,493
8	3,616,594	7,790,820	1,147,999	2,404,248	442,965	968,219	546,730	1,313,028
9	387,210	778,563	1,322,139	2,734,656	576,482	1,246,036	817,926	1,965,899
10	205,454	374,881	764,189	1,622,828	387,172	883,103	405,198	942,079
11	180,519	335,921	94,793	162,831	118,599	222,777	111,521	249,621
12	137,895	252,048	54,052	98,561	62,708	127,611	44,003	102,500

Source: PacFIN VSMRFD files. July 2004

Note: Data shown is for PFMC management areas and does not include areas such as Puget Sound and Columbia River for example.

Landings and Revenue from Limited Entry Fixed Gear Vessels

Vessels deploying longlines and traps (pots) comprise the bulk of the limited entry fixed gear sector. These gear types also may be used by vessels in the open access sector, but preferential harvest limits favor limited entry permit holders. Fixed gear vessels primarily target the high-value sablefish; this species accounts for a large share of landings, especially when measured by exvessel value.

According to PacFIN data, the majority of limited entry fixed gear landings occur in Oregon and Washington. Oregon and Washington also have a higher price per pound for sablefish, while California has a higher price per pound for other types of groundfish. This is most likely representative of the higher amount of high valued live fish landings that occur in California, as opposed to Oregon and Washington.

Table 16. Landings and Exvessel Revenue made by Limited Entry Vessels with Fixed Gear by State and Year (Hkl and Pot Gear)

State	Species Aggregation	Data Type	Year			
			2000	2001	2002	2003
CA	Non-Sablefish Groundfish	Landed Weight (lbs)	558,671	544,400	527,015	609,251
		Exvessel Revenue (\$)	1,089,097	973,961	938,230	1,264,475
	Sablefish	Landed Weight (lbs)	1,209,816	961,551	776,349	859,625
		Exvessel Revenue (\$)	1,867,147	1,448,199	1,146,177	1,508,804
OR	Non-Sablefish Groundfish	Landed Weight (lbs)	163,965	227,351	112,882	83,201
		Exvessel Revenue (\$)	242,990	366,559	200,186	117,054
	Sablefish	Landed Weight (lbs)	2,170,149	1,549,376	958,843	1,329,379
		Exvessel Revenue (\$)	4,874,550	3,426,052	2,278,876	3,339,126
WA	Non-Sablefish Groundfish	Landed Weight (lbs)	845,502	573,704	991,433	503,736
		Exvessel Revenue (\$)	240,463	161,697	221,228	119,652
	Sablefish	Landed Weight (lbs)	843,220	761,788	627,641	1,061,477
		Exvessel Revenue (\$)	2,476,966	2,138,753	1,873,744	3,194,644

Source: PacFIN FTL table. July 2004

Note: Data shown is for PFMC management areas and does not include areas such as Puget Sound and Columbia River for example.

Table 17 shows the top 15 ports (of the 62 receiving landings) for limited entry fixed gear landings and exvessel revenue from 2000–2003. The largest ports for limited entry fixed gear landings and exvessel revenue, located within Washington, Oregon, and northern California, differ only slightly in the order of landings by rate and of exvessel revenue. The top five ports for landings make up approximately 54% of total landings, while the top five ports for revenue make up approximately 49% of total exvessel revenues for limited entry fixed gear vessels.

Table 17. Largest Ports for Limited Entry Fixed Gear Landings and Exvessel Revenue (2000 - 2003)

Rank	Top Ports for Exvessel Revenue	Top Ports for Landings
1	NEWPORT	BELLINGHAM BAY
2	BELLINGHAM BAY	NEWPORT
3	ASTORIA	MOSS LANDING
4	CHARLESTON (COOS BAY)	ASTORIA
5	MOSS LANDING	PORT ORFORD
6	WESTPORT	CHARLESTON (COOS BAY)
7	PORT ORFORD	WESTPORT
8	PORT ANGELES	PORT ANGELES
9	EUREKA	EUREKA
10	CRESCENT CITY	CRESCENT CITY
11	OCEANSIDE	SAN FRANCISCO
12	FORT BRAGG	FORT BRAGG
13	SAN FRANCISCO	OCEANSIDE
14	FLORENCE	FLORENCE
15	SEATTLE	NEWPORT BEACH

Source: PacFIN FTL table. July 2004

The Groundfish Open Access Sector

The open access sector consists of vessels that do not hold a federal groundfish limited entry permit and target or incidentally catch groundfish using a variety of gears. The open access appellation can be confusing because vessels in this sector may hold limited entry permits for other, nongroundfish fisheries issued by the federal or state governments. However, groundfish catches by these vessels are regulated under the groundfish FMP. For example, open access vessels must comply with cumulative trip limits established for the open access sector and are subject to the other operational restrictions imposed in the regulations, including general exclusion from the RCA.

Fixed gear catch most open access groundfish, although non-shrimp trawl gear and net gear also make substantial landings (Table 18). Sablefish and rockfish generally comprise the largest source of open access landings by weight and revenue, followed by other groundfish, flatfish, and skates (Table 20).

Table 18. Open Access Groundfish Landings and Exvessel Revenue by State, Year, and Gear Group

			Year			
State	Gear Group	Data Type	2000	2001	2002	2003
CA	Dredge	Landed Weight (lbs)			C	
		Exvessel Revenue (\$)			C	
	Hook and Line	Landed Weight (lbs)	1,218,626	1,053,789	865,280	818,292
		Exvessel Revenue (\$)	2,871,120	2,521,246	1,864,774	1,644,510
	Misc.	Landed Weight (lbs)	2,140	148	229	63
		Exvessel Revenue (\$)	3,151	448	1,154	65
	Net	Landed Weight (lbs)	100,870	128,117	98,048	106,461
		Exvessel Revenue (\$)	85,625	106,763	88,543	97,987
	Pot	Landed Weight (lbs)	361,750	305,553	263,532	387,890
		Exvessel Revenue (\$)	852,555	704,248	557,881	677,169
OR	Shrimp Trawl	Landed Weight (lbs)	18,084	8,932	8,508	4,532
		Exvessel Revenue (\$)	18,753	10,806	11,885	7,045
	Non-Shrimp Trawl	Landed Weight (lbs)	54,701	15,949	19,232	4,563
		Exvessel Revenue (\$)	45,766	12,511	20,727	5,253
	Hook and Line	Landed Weight (lbs)	421,803	563,759	615,247	642,047
		Exvessel Revenue (\$)	749,701	995,381	1,280,502	1,160,157
	Net	Landed Weight (lbs)	C	C	C	C
		Exvessel Revenue (\$)	C	C	C	C
	Pot	Landed Weight (lbs)	10,449	28,488	24,453	41,978
		Exvessel Revenue (\$)	19,093	54,702	57,569	89,877
WA	Shrimp Trawl	Landed Weight (lbs)	21,978	19,527	9,376	8,904
		Exvessel Revenue (\$)	19,824	15,193	7,291	7,785
	Non-Shrimp Trawl	Landed Weight (lbs)		173,020		
		Exvessel Revenue (\$)		85,548		
	Hook and Line	Landed Weight (lbs)	182,386	206,037	184,726	376,393
		Exvessel Revenue (\$)	258,062	278,436	303,130	538,521
	Net	Landed Weight (lbs)	C	C	C	C
		Exvessel Revenue (\$)	C	C	C	C
	Pot	Landed Weight (lbs)	864	477		11,132
		Exvessel Revenue (\$)	1,817	1,284		28,035
Total	Shrimp Trawl	Landed Weight (lbs)	23,355	17,145	20,332	25,063
		Exvessel Revenue (\$)	11,537	9,774	12,577	12,905
	Non-Shrimp Trawl	Landed Weight (lbs)	73,597	236,614	604,280	823,468
		Exvessel Revenue (\$)	32,382	112,078	288,282	410,344
	Total Landed Weight (lbs)		2,490,891	2,757,572	2,714,645	3,251,081
	Total Exvessel Revenue (\$)		4,969,431	4,908,420	4,495,652	4,679,666

Source: PacFIN VSMRFD files. July 2004

Note: C represents data restricted due to confidentiality

Note: Data shown is for PFMC management areas and does not include areas such as Puget Sound and Columbia River for example.

Fishery managers divide the open access sector into directed and incidental categories. The directed fishery consists of vessels targeting groundfish while the incidental fishery category applies to vessels

targeting other fish but landing some groundfish in the process. In practice, segregating the vessels into these two categories may not represent fisher intentions. Over the course of a year—or even during a single trip—a fisher may engage in several different strategies, switching among the directed and incidental categories. Such changes in strategy likely result from a variety of factors, but especially from the potential economic return from landing a particular mix of species. Because of these complexities, managers typically distinguish directed from incidental vessels by applying a value threshold to the landings composition for a particular vessel (or trip, depending on the kind of analysis): open access vessels with more than half of their total landings value coming from groundfish are included in the directed fishery, with the remainder assigned to the incidental category. Based on this criterion, 2,723 unique vessels targeted groundfish in the open access fishery between 1995 and 1998 coastwide, while 2,024 unique vessels landed groundfish as incidental catch (1,231 of these vessels participated in both) (SSC Economic Subcommittee 2000).

Fisheries generally occur along the coast in patterns governed by factors such as location of target species, presence of ports with supporting marine supplies and services, and restrictions or regulations imposed by state and federal governments. The majority of landings by the directed groundfish fishery, by weight, occur off California, while Oregon shows the next highest landings (Hastie 2001). Washington has the lowest groundfish landings for directed and incidental fisheries. Participation in the open access fishery is much greater in California than in Oregon and Washington combined. In 1998, 779 California boats, 232 Oregon boats, and 50 Washington boats participated in the directed open access groundfish fishery; and 520 California boats, 305 Oregon boats, and 40 Washington boats participated in the incidental open access fishery (SSC Economic Subcommittee 2000).

Fishers generally use hook-and-line gear, the most common open access gear type, to target sablefish, rockfish, and lingcod; they generally use pot gear when targeting sablefish and some thornyheads and rockfish. Regulations currently restrict Southern and Central California setnet gear, previously used to target rockfish, including chilipepper, widow rockfish, bocaccio, yellowtail rockfish, and olive rockfish, and to a lesser extent vermillion rockfish.

Higher prices for live groundfish have stimulated landings in this category: in 2001, 20% of fish landed (by weight, coastwide) by directed open access fishers was alive, compared to only 6% in 1996.² Fishers use pots, stick gear, and rod-and-reel to catch live fish, and keep them aboard the vessel in a seawater tank. Fishers deliver them to foodfish markets—such as the large Asian communities in California—that pay a premium for live fish. Currently, Oregon and California are drafting nearshore fishery management plans that would move some species of groundfish landed in the live fish fishery from federal to state management.

Many fishers catch groundfish incidentally when targeting other species because of the kind of gear they use and the co-occurrence of target and groundfish species in a given area. Fisheries targeting pink shrimp, spot prawn, ridgeback prawn, California and Pacific halibut, Dungeness crab, salmon, sea cucumber, coastal pelagic species, California sheephead, highly migratory species, and the mix of species caught in the gillnet complex account for the incidental segment of the open access sector.

2/ Managers are faced with a similar problem as discussed above in determining landings from this fishery. Landings data do distinguish live fish sales, but the price information suggests that this classification is inaccurate. Therefore, in practice, only those sales of species other than sablefish that garner a landed price above \$2.50 per pound are classified in the live fish sector.

Distribution of Effort by Groundfish Open Access Vessels

Limited information exists on the distribution of effort by open access vessels. The open access sector is made up of many different gear types, along with directed and incidental catch, which makes it difficult to discern the location of effort, though based on the diversity of this sector, it is reasonable to assume that effort is widespread across the West Coast. The open access sector has an increasing large live-fish fishery component; because nearshore species make up most of the live fish landings, effort located near shore likely accounts for most live fish landings. The live fish fishery is a quickly growing component of the open access sector and will likely continue to grow in the nearshore areas.

As shown in Table 19, open access landings and revenue tend to occur primarily during the spring, summer, and fall months. Assuming that landed catch represents directed open access, and that landed catch is a function of effort, then more open access related fishing activity occurs during the spring, summer, and fall months than winter months.

Table 19. Open Access Groundfish Landings and Exvessel Revenue by Year and Month

Month	Data Type	Year			
		2000	2001	2002	2003
Jan	Landed Weight (lbs)	93,701	112,254	181,903	110,711
	Exvessel Revenue (\$)	145,656	223,168	306,917	205,300
Feb	Landed Weight (lbs)	41,385	165,665	182,796	163,689
	Exvessel Revenue (\$)	65,017	302,154	414,606	340,653
Mar	Landed Weight (lbs)	73,791	143,817	252,550	160,549
	Exvessel Revenue (\$)	146,782	233,427	336,792	185,578
Apr	Landed Weight (lbs)	159,222	167,204	179,382	245,277
	Exvessel Revenue (\$)	288,795	289,676	302,902	254,953
May	Landed Weight (lbs)	183,220	258,256	262,229	292,340
	Exvessel Revenue (\$)	375,394	548,591	533,438	579,894
Jun	Landed Weight (lbs)	254,531	261,425	312,602	270,832
	Exvessel Revenue (\$)	536,131	500,489	548,528	532,533
Jul	Landed Weight (lbs)	317,609	515,377	273,616	291,337
	Exvessel Revenue (\$)	577,348	757,606	476,710	573,222
Aug	Landed Weight (lbs)	293,626	360,067	303,725	344,512
	Exvessel Revenue (\$)	683,134	638,477	504,046	549,447
Sep	Landed Weight (lbs)	256,663	306,550	305,507	536,720
	Exvessel Revenue (\$)	548,398	538,645	357,348	627,820
Oct	Landed Weight (lbs)	250,241	191,702	184,380	392,800
	Exvessel Revenue (\$)	477,569	418,312	315,544	401,556
Nov	Landed Weight (lbs)	271,041	193,812	196,511	359,501
	Exvessel Revenue (\$)	522,012	302,037	292,301	344,660
Dec	Landed Weight (lbs)	295,861	81,443	79,445	82,812
	Exvessel Revenue (\$)	603,194	155,837	106,519	84,050

Source: PacFIN VSMRFD files. July 2004

Note: Data shown is for PFMC management areas and does not include areas such as Puget Sound and Columbia River for example.

Landings and Revenue from Groundfish Open Access Vessels

Rockfish, thornyheads, and sablefish make up most of the open access landings and revenue (Table 20), and hook and line accounts for the largest gear type for open access landings (Table 3-21). Open access landings in the state of California have a large live fish component, which is made evident by the relatively high unit value of rockfish in that state compared to the unit value of rockfish in Oregon and Washington. Many of the largest ports for open access landings and revenue are located in California (Table 21).

Table 20. Open Access Groundfish Landings and Exvessel Revenue by Year, State, and Species

			Year			
State	Species Aggregation	Data Type	2000	2001	2002	2003
CA	Flatfish and Skates	Landed Weight (lbs)	93,158	48,856	42,579	15,140
		Exvessel Revenue (\$)	87,688	63,929	61,621	20,649
	Rockfish(a)	Landed Weight (lbs)	705,190	652,021	486,113	461,812
		Exvessel Revenue (\$)	1,789,851	1,750,273	1,259,855	1,027,475
	Other Groundfish	Landed Weight (lbs)	300,719	253,393	185,577	169,155
		Exvessel Revenue (\$)	1,070,487	775,543	533,652	506,268
	Sablefish	Landed Weight (lbs)	657,104	558,217	541,963	675,694
		Exvessel Revenue (\$)	928,945	766,276	691,173	877,637
OR	Flatfish and Skates	Landed Weight (lbs)	310	22,435	1,034	1,750
		Exvessel Revenue (\$)	69	12,341	159	391
	Rockfish(a)	Landed Weight (lbs)	241,363	455,647	309,452	260,633
		Exvessel Revenue (\$)	292,445	428,552	478,855	329,766
	Other Groundfish	Landed Weight (lbs)	123,930	176,758	242,546	150,631
		Exvessel Revenue (\$)	329,379	462,625	678,185	399,524
	Sablefish	Landed Weight (lbs)	88,627	129,954	96,044	280,209
		Exvessel Revenue (\$)	166,725	247,306	188,163	528,151
WA	Flatfish and Skates	Landed Weight (lbs)	2,899	6,052	3,045	23,268
		Exvessel Revenue (\$)	814	1,453	1,067	4,533
	Rockfish(a)	Landed Weight (lbs)	172,836	338,792	670,658	662,355
		Exvessel Revenue (\$)	80,701	164,664	323,228	319,673
	Other Groundfish	Landed Weight (lbs)	31,187	26,426	36,572	369,093
		Exvessel Revenue (\$)	15,785	15,262	20,284	172,052
	Sablefish	Landed Weight (lbs)	73,567	89,021	99,063	181,340
		Exvessel Revenue (\$)	206,543	220,195	259,410	493,547
Total Landed Weight (lbs)			2,490,890	2,757,572	2,714,646	3,251,080
Total Exvessel Revenue (\$)			4,969,432	4,908,419	4,495,652	4,679,666

a) The "Rockfish" aggregation includes thornyheads and scorpionfish

Source: PacFIN VSMRFD files. July 2004

Note: Data shown is for PFMC management areas and does not include areas such as Puget Sound and Columbia River for example.

Table 21. Top Ports for Open Access Groundfish Landings and Revenue (2000 - 2003)

Rank	Top 15 Ports for Landed Revenue	Top 15 Ports for Landed Weight
1	MORRO BAY	MOSS LANDING
2	PORT ORFORD	NEAH BAY
3	MOSS LANDING	FORT BRAGG
4	FORT BRAGG	PORT ORFORD
5	GOLD BEACH	PORT ANGELES
6	AVILA	MORRO BAY
7	SANTA BARBARA	GOLD BEACH
8	PORT ANGELES	WESTPORT
9	CRESCENT CITY	EUREKA
10	NEAH BAY	CRESCENT CITY
11	SAN FRANCISCO	ASTORIA
12	MONTEREY	SAN FRANCISCO
13	ASTORIA	AVILA
14	EUREKA	CHARLESTON (COOS BAY)
15	WESTPORT	BROOKINGS

Source: PacFIN VSMRFD files. July 2004

NonGroundfish Fisheries

Fisheries targeting nongroundfish species can affect groundfish management in the following ways:

- Fisheries targeting groundfish may incidentally catch other species, thus management measures that change total fishing effort in groundfish fisheries could increase or decrease fishing mortality of incidentally-caught non-groundfish species;
- Management measures affecting groundfish fisheries may create a secondary effect by inducing additional effort in non-groundfish fisheries on the part of any groundfish fishermen displaced by groundfish regulations;
- Management measures intended to reduce or eliminate incidental catches of overfished groundfish species may affect nongroundfish fisheries that catch the overfished species; and
- The spatial distribution of effort within non-groundfish fisheries may overlap with habitat areas that are of interest to this EIS.

Dungeness Crab Fishery

The states of Oregon and California, and the State of Washington in cooperation with Washington Coast treaty tribes manage the Dungeness crab fishery. The PSMFC provides inter-state coordination. The Dungeness crab fishery is divided between treaty sectors, covering catches by Indian Tribes, and a non-treaty sector. This fishery is managed on the basis of simple “3-S” principles: sex, season, and size. The commercial fishery may retain only male crabs (thus protecting the reproductive potential of the populations); the fishery has open and closed seasons; and the commercial fishery must comply with a

minimum size limit on male crabs. Washington manages the Dungeness fishery with a limited entry system with two tiers of pot limits and a season from December 1 through September 15. In Oregon, 306 vessels made landings in 1999 during a season that generally starts on December 1. In California, distinct fisheries occur in Northern and Central California, with the northern fishery covering a larger area. California implemented a limited entry program in 1995, and as of March 2000 about 600 California residents and 70 non-residents had limited entry permits. Nonetheless, effort has increased with the entry of larger multipurpose vessels from other fisheries. Landings have not declined, but this effort increase has resulted in a “race for fish” with more than 80% of total landings made during the month of December.

Both personal use fishers and commercial fishers target Dungeness crab. At the commercial level, the Dungeness crab fishery generates \$67 to \$130 million in exvessel revenue (Table 3-25); in recent years (2002 and 2003) the amount of exvessel revenue generated by the fishery has been increasing due in part to increases in stock biomass. For many vessels, the Dungeness crab fishery is the largest source of exvessel revenues. For example, in 2003 approximately 30% of the limited entry trawlers made more money from Dungeness crab than from groundfish activity.

The majority of Dungeness crab fishing effort and catch occurs during the months of December and January. Many types of vessels participate in this fishery including vessels that may otherwise be limited entry groundfish trawlers, limited entry groundfish fixed gear vessels, or other types of vessels that may be considered albacore trollers for example.

The Dungeness crab fishery tends to occur in areas nearer to shore than the limited entry trawl and fixed gear fisheries. To avoid gear interactions with the Dungeness crab fishery, the Councils’s Groundfish Management Team has made a conscious effort to allow groundfish trawl vessels access to waters deeper than 60 fathoms during winter months.

All three states are comparable in terms of landed weight and revenue in coastal management areas, and Washington has a substantial additional component in Puget Sound. Washington had the highest landings recent years for coastal Dungeness crab, followed closely by Oregon and California. The ports with highest landings are distributed among the three states (Table 3-26).

Table 22. Landings and Exvessel Revenue of Dungeness Crab by Area, State, and Year (2000 - 2003)

			YEAR			
Area	State	Data type	2000	2001	2002	2003
Coastal Management Areas	CA	Landed weight (lbs)	6,482,913	3,546,106	7,297,676	22,196,754
		Exvessel revenue (\$)	13,751,700	9,009,756	13,458,089	35,270,665
	OR	Landed weight (lbs)	11,180,845	9,689,804	12,442,612	23,480,735
		Exvessel revenue (\$)	23,710,261	19,291,484	20,759,342	36,399,904
	WA	Landed weight (lbs)	11,700,416	12,049,827	16,101,625	28,191,992
		Exvessel revenue (\$)	25,609,842	24,003,463	26,707,196	45,129,820
Other Management Areas	CA	Landed weight (lbs)	C			
		Exvessel revenue (\$)	C			
	WA	Landed weight (lbs)	6,732,220	7,522,403	6,944,948	6,941,032
		Exvessel revenue (\$)	14,084,886	14,752,254	13,548,402	13,259,518
Total Landed weight (lbs)			36,096,394	32,808,140	42,786,861	80,810,513*
Total Exvessel revenue (\$)			77,156,690	67,056,957	74,473,029	130,071,468*

Source: PacFIN ftl table. August 2004

Note: C represents data restricted due to confidentiality

“Other management areas” includes inside waters such as Puget Sound and Columbia River

* totals do not include confidential data

Table 23. Top 15 Ports for Dungeness Crab Landings and Revenue (2000 - 2003)

Rank	Top Ports for Dungeness Crab by Weight	Top Ports for Dungeness Crab by Value
1	WESTPORT	WESTPORT
2	ASTORIA	ASTORIA
3	CRESCENT CITY	CRESCENT CITY
4	NEWPORT	NEWPORT
5	BELLINGHAM BAY	BELLINGHAM BAY
6	CHARLESTON (COOS BAY)	CHARLESTON (COOS BAY)
7	EUREKA	EUREKA
8	BROOKINGS	BLAINE
9	BLAINE	BROOKINGS
10	ILWACO	SAN FRANCISCO
11	SAN FRANCISCO	LACONNER
12	CHINOOK	ILWACO
13	LACONNER	CHINOOK
14	TAHOLAH	TAHOLAH
15	ANACORTES	PRINCETON / HALF MOON BAY

Source: PacFIN FTL table. July 2004

Highly Migratory Species Fisheries

Highly migratory species (HMS), including tunas, billfish, dorado (dolphinfish), and sharks, range great distances during their lifetime, extending beyond national boundaries into international waters and among the EEZs of many nations in the Pacific. In 2003, the Council adopted a Highly Migratory Species FMP (PFMC 2003) to federally regulate the take of HMS within and outside the U.S. West Coast EEZ. NMFS approved the FMP, allowing implementation, on January 30, 2004. Complex management of HMS results from the multiple management jurisdictions, users, and gear types targeting these species, and from the oceanic regimes that play a major role in determining species availability and which species will be harvested off the U.S. West Coast in a given year.

The management unit consists of five tuna species, five shark species, striped marlin, swordfish, and dorado. Albacore tuna account for a large majority of the landed weight and value (Table 3-27). NMFS will monitor the numerous species caught by the HMS fishery, but which are not part of the fishery management unit.

Commercial fishers use five distinctive gear types used to harvest HMS: hook-and-line, driftnet, pelagic longline, purse seine, and harpoon (Table 3-28).

While hook-and-line gear catches many HMS species, traditionally it has been used to harvest tunas. The principal target species for hook-and-line fisheries include albacore and other tunas, swordfish and other billfish, several shark species, and dorado. Albacore make up the highest hook and line landings, with the majority taken by troll and jig-and-bait gear (92% in 1999). Gillnet, drift longline, and other gear take a small portion of fish. These gear types vary in the incidence of groundfish interception depending on the area fished and time of year. Overall, nearly half of the total coastwide landings of albacore, by weight, were landed in California.

Fishers use pelagic longline to target swordfish, shark and tunas; drift gillnet gear to target swordfish, tunas, and sharks off California and Oregon; purse seine gear to target tuna off California and Oregon; and harpoon to target swordfish off California and Oregon. Some vessels, especially longliners and purse seiners, fish outside of the EEZ, but may deliver to West Coast ports. Drift gillnets intercept most groundfish, including whiting, spiny dogfish, and yellowtail rockfish. Most landings occur in Washington and Oregon (Table 3-28), and the top several ports occur in these states (Table 3-29).

Table 24. Landings and Revenue of HMS by Species and Year

Species Type	Data Type	Year			
		2000	2001	2002	2003
Albacore	Landed weight (lbs)	19,848,814	24,495,425	22,063,692	36,485,624
	Exvessel revenue (\$)	17,103,010	20,577,991	14,272,304	24,305,367
Shark	Landed weight (lbs)	547,195	567,274	517,745	491,807
	Exvessel revenue (\$)	720,450	670,249	629,727	588,697
Other Tuna	Landed weight (lbs)	1,559,831	1,644,104	78,491	113,077
	Exvessel revenue (\$)	900,461	833,464	90,157	100,998
Dorado and Marlin	Landed weight (lbs)	8,946	18,394	C	C
	Exvessel revenue (\$)	12,633	13,501	C	C
Swordfish	Landed weight (lbs)	1,252,875	640,799	609,248	980,229
	Exvessel revenue (\$)	4,054,296	2,158,192	2,264,288	3,131,158
Total Landed Weight (lbs)		23,217,661	27,365,996	23,269,176*	38,070,737*
Total Exvessel Revenue (\$)		22,790,849	24,253,397	17,256,476*	28,126,220*

Source: PacFIN FTL table. July 2004

Note: C represents data restricted due to confidentiality

* totals do not include confidential data

Table 25. HMS Landings and Exvessel Revenue by State, Year, and Major Gear Group

State	Gear Group	Data Type	YEAR			
			2000	2001	2002	2003
CA	Hook and Line	Landed weight (lbs)	2,323,968	2,402,114	4,534,829	2,697,411
		Exvessel revenue (\$)	2,741,226	2,334,606	2,945,594	2,741,955
	Net	Landed weight (lbs)	2,902,991	2,802,769	1,090,415	930,255
		Exvessel revenue (\$)	3,975,012	2,850,343	2,225,363	1,741,480
	Troll	Landed weight (lbs)	1,964,550	3,907,886	1,364,167	1,360,872
		Exvessel revenue (\$)	1,872,012	3,063,523	1,024,421	988,564
OR	Hook and Line	Landed weight (lbs)	C	76,513	323,497	C
		Exvessel revenue (\$)	C	41,340	198,261	C
	Net	Landed weight (lbs)	C		C	86,604
		Exvessel revenue (\$)	C		C	13,720
	Troll	Landed weight (lbs)	8,755,933	8,948,222	4,036,735	9,039,680
		Exvessel revenue (\$)	7,488,326	7,545,405	2,752,640	6,115,181
WA	Hook and Line	Landed weight (lbs)	C	C	C	
		Exvessel revenue (\$)	C	C	C	
	Net	Landed weight (lbs)	C			
		Exvessel revenue (\$)	C			
	Troll	Landed weight (lbs)	7,020,617	9,145,451	11,776,387	23,792,124
		Exvessel revenue (\$)	5,836,813	7,947,279	7,418,555	15,706,940

Source: PacFIN FTL table. July 2004.

Note: C represents data restricted due to confidentiality

Table 26. Top Ports for HMS Landings and Exvessel Revenue (2000 - 2003)

Rank	Top 15 Ports by Weight	Top 15 Ports by Exvessel Revenue
1	ILWACO	ILWACO
2	NEWPORT	NEWPORT
3	WESTPORT	WESTPORT
4	ASTORIA	ASTORIA
5	CHARLESTON (COOS BAY)	SAN DIEGO
6	TERMINAL ISLAND	MORRO BAY
7	EUREKA	SAN PEDRO
8	MORRO BAY	CHARLESTON (COOS BAY)
9	MOSS LANDING	TERMINAL ISLAND
10	BELLINGHAM BAY	EUREKA
11	SAN PEDRO	MOSS LANDING
12	SAN DIEGO	BELLINGHAM BAY
13	OCEANSIDE	SAN FRANCISCO
14	FIELDS LANDING	OCEANSIDE
15	CRESCENT CITY	CRESCENT CITY

Source: PacFIN FTL table. July 2004

Pacific Pink Shrimp Fishery

Pacific pink shrimp (*Pandalus jordani*) range from Unalaska in the Aleutian Islands to San Diego, California, at depths of 25 fm to 200 fm (46 m to 366 m). Pink shrimp tend to aggregate in well-defined areas of green mud and muddy-sand bottoms. The states of Washington, Oregon, and California manage the Pacific shrimp fisheries. The Council has no direct management authority. In 1981, the three coastal states established uniform coastwide regulations for the pink shrimp fishery. The season runs from April 1 through October 31. Regulations authorize pink shrimp commercial harvest only by trawl nets or pots. Trawl gear harvests most of these shrimp off the West Coast from Northern Washington to Central California at depths from 60 fm and 100 fm (110 m to 180 m), with the majority taken off Oregon (Table 3-30). The ports with highest landings also occur in Oregon, followed by Washington and Oregon ports (Table 3-31).

Most shrimp trawl gear has a mesh size of one inch to three-eighths inches between knots. Shrimp trawl nets are usually constructed with net mesh sizes smaller than the net mesh sizes for legal groundfish trawl gear. Thus, shrimp trawlers commonly catch groundfish, while groundfish trawlers catch little shrimp. In some years the pink shrimp trawl fishery has accounted for a significant share of canary rockfish incidental catch. The Council has discussed methods to control shrimp fishing activities, such as requiring all vessels to use bycatch reduction devices (finfish excluders). In 2002, finfish excluders in the pink shrimp fisheries were mandatory in California, Oregon, and Washington. Many vessels that participate in the shrimp trawl fishery also have groundfish limited entry permits. Vessels participating in the pink shrimp fishery must abide by the same rules as vessels that do not have groundfish limited entry permits. However, all groundfish landed by vessels with limited entry permits are included in the limited entry total.

Table 27. Pink Shrimp Landings and Exvessel Revenue by Year and State (LBS and USD)

		YEAR			
State	Data Type	2000	2001	2002	2003
CA	Landed weight (lbs)	2,459,095	3,612,205	4,116,213	2,147,685
	Exvessel revenue (\$)	1,049,119	992,644	1,275,023	657,159
OR	Landed weight (lbs)	25,462,479	28,482,140	41,583,534	20,545,976
	Exvessel revenue (\$)	10,192,294	7,560,473	11,352,588	5,051,246
WA	Landed weight (lbs)	4,360,914	6,590,344	10,105,043	7,893,802
	Exvessel revenue (\$)	1,700,410	1,713,687	2,745,707	1,959,662
Total Landed Weight (lbs)		32,282,488	38,684,689	55,804,790	30,587,463
Total Exvessel Revenue (\$)		12,941,823	10,266,804	15,373,317	7,668,068

Source: PacFIN FTL table. July 2004

Table 28. Top 15 Ports for Pink Shrimp Landings and Exvessel Revenue (2000–2003)

Rank	Top Ports by Weight	Top Ports by Exvessel Revenue
1	ASTORIA	ASTORIA
2	NEWPORT	NEWPORT
3	CHARLESTON (COOS BAY)	CHARLESTON (COOS BAY)
4	WESTPORT	WESTPORT
5	GARIBALDI (TILLAMOOK)	GARIBALDI (TILLAMOOK)
6	EUREKA	EUREKA
7	CRESCENT CITY	CRESCENT CITY
8	BROOKINGS	BROOKINGS
9	ILWACO	ILWACO
10	SOUTH BEND	SOUTH BEND
11	TOKELAND	MORRO BAY
12	MORRO BAY	TOKELAND
13	AVILA	AVILA
14	FIELDS LANDING	FIELDS LANDING
15	MONTEREY	MONTEREY

Source: PacFIN FTL table. July 2004

Ridgeback Prawn Fisheries

Ridgeback prawns (*Sicyonia ingentis*) range from south of Monterey, California to Baja California, Mexico, in depths of 145 meters to 525 meters (Sunada et al. 2001). The highest prawn abundance occurs south of Point Conception where they are the most common invertebrate appearing in trawls. They prefer sand, shell, and green mud substrate, and have a relatively sessile lifestyle. Although information about their feeding habits is limited, prawns probably feed on detritus, and in turn fall prey to sea robins, rockfish, and lingcod. Unlike other shrimp species, which carry their eggs during maturation, ridgeback prawns release their eggs into the water column. They spawn seasonally from June to October. Surveys recorded increasing abundance of ridgeback prawns from 1982, when surveys began, to 1985; the population then declined until the 1990s when recent CPUE data suggest increased abundance. Climate phenomena, particularly El Niño events, may cause these changes.

The Ridgeback prawn fishery occurs exclusively in California, centered in the Santa Barbara Channel and off Santa Monica Bay. In 1999, 32 boats participated in the ridgeback prawn fishery. Traditionally, a number of boats fish year-round for both ridgeback and spot prawns, targeting ridgeback prawns during the closed season for spot prawns and vice versa. Most boats typically use single-rig trawl gear. Shrimp gear accounts for nearly all prawn landings, although groundfish trawl and other gears take minor amounts (Table 3-32). The top ports for landed weight and exvessel value occur in the Santa Barbara Channel-Santa Monica Bay region (Table 3-33). The State of California manages the ridgeback prawn fishery. Similar to spot prawn and pink shrimp fisheries, prawns are an “exempted” fishery in the federal open access groundfish fishery, entitling to groundfish trip limits.

Following a 1981 decline in landings, the California Fish and Game Commission adopted a June through September closure to protect spawning female and juvenile ridgeback prawns. Regulations allow an incidental take of 50 pounds of prawns or 15% by weight during the closed period. During the open prawn season, federal regulations limit finfish landings per trip to a maximum of 1,000 pounds, with no more than 300 pounds of groundfish. A vessel operator may land any amount of sea cucumbers with ridgeback prawns as long as the operator possesses a sea cucumber permit. Other regulations include a

prohibition on trawling within state waters, a minimum fishing depth of 25 fm, a minimum mesh size of 1.5 inches for single-walled cod ends or 3 inches for double-walled cod ends and maintaining a logbook (required since 1986).

Table 29. Ridgeback Prawn Landings and Exvessel Revenue by Year (LBS and USD)

Gear Group	Data Type	YEAR			
		2000	2001	2002	2003
Trawl	Landed weight (lbs)	141,160	16,920	19,735	12,454
	Exvessel revenue (\$)	165,345	26,976	31,599	14,641
Shrimp Trawl	Landed weight (lbs)	1,414,844	340,024	422,240	486,890
	Exvessel revenue (\$)	1,633,636	508,853	606,064	669,274
Other Gears	Landed weight (lbs)	10,172	0	0	237
	Exvessel revenue (\$)	13,201	0	0	641
Total Landed Weight (lbs)		1,566,176	356,944	441,975	499,581
Total Exvessel Revenue (\$)		1,812,182	535,829	637,663	684,557

Source: PacFIN FTL table. July 2004

Table 30. Rank of All Ports with Ridgeback Prawn Landings and Exvessel Revenue (2000–2003)

Rank	Rank of Ports by Weight	Rank of Ports by Exvessel Revenue
1	SANTA BARBARA	SANTA BARBARA
2	VENTURA	VENTURA
3	OXNARD	OXNARD
4	TERMINAL ISLAND	TERMINAL ISLAND
5	LONG BEACH	LONG BEACH
6	PLAYA DEL REY	PLAYA DEL REY
7	PORT HUENEME	PORT HUENEME
8	SAN PEDRO	SAN PEDRO
9	MORRO BAY	MORRO BAY
10	AVILA	AVILA
11	SAN SIMEON	SAN SIMEON
12	POINT ARENA	POINT ARENA
13	PRINCETON / HALF MOON BAY	PRINCETON / HALF MOON BAY

Source: PacFIN ftl table. August 2004

Kelp Fishery

The giant kelp forest canopy serves as a nursery, feeding grounds, and/or shelter for a variety of groundfish species and their prey. Kelp plants naturally break free of their holdfasts, and drift with waves and currents along the bottom to deep-water habitats and in surface waters to beaches and rocky intertidal areas. Kelp detritus supports high secondary production and prey for many fishes.

The commercial harvest of giant kelp forests has occurred in California since 1910. However, harvest has declined in recent years to about one-third of that in the early 1990s (Table 3-34). Specially designed ships harvest kelp. The ships cut the surface canopy no lower than 1.2 m below the surface in a strip eight

meters wide, much like a lawn mower. Regulations imposed by the State of California ensure that harvesting activities have a minimal impact on kelp forests. Kelp canopies cut according to this regulation generally grow back within several weeks to a few months.

Kelp harvesting can have a variety of possible impacts on kelp forests and nearshore communities. For example, giant kelp is a source of food for other marine communities, and unregulated harvest of kelp can potentially remove a substantial portion of this source. The kelp canopy also serves as habitat for canopy-dwelling invertebrates and may have an enhancing effect on fish recruitment and abundance; these functions can be severely impeded by unregulated harvesting operations. Removal of the canopy can displace fish such as young-of-the-year rockfishes. Extensive or permanent loss of kelp canopy could have adverse impacts on local fish recruitment and abundance.

The following references were used in compiling this description: California Department of Fish and Game (1995), Cross and Allen (1993), Feder et al. (1974), Foster and Schiel (1985), and Vetter (1995).

Table 31. Harvest of Kelp off California by Year

Year	Harvested Weight (short tons)
1990	151,439.21
1991	127,504.68
1992	91,246.54
1993	92,940.41
1994	81,006.38
1995	77,753.00
1996	78,461.00
1997	73,165.00
1998	25,313.00
1999	42,211.00
2000	46,200.00
2001	40,298.00
2002	51,868.00

Source: California Department of Fish and Game. As cited at NMFS SWR website Aug 2004. <http://swr.nmfs.noaa.gov/fmd/bill/kelp.htm>.

Salmon

The ocean commercial salmon fishery, both non-treaty and treaty, is managed by both the states and the federal government. The Council manages fisheries in the EEZ while the states manage fisheries in their waters. All ocean commercial salmon fisheries off the West Coast states use troll gear, and primarily target chinook and coho. Limited pink salmon landings occur in odd-years. A gillnet/tangle net fishery that does not technically occur in Council-managed waters may have some impact on groundfish that migrate through state waters. Commercial coho landings fell precipitously in the early 1990s and remain very low. In response to the listing of many wild salmon stocks under the ESA, the management regime is largely structured around so-called “no jeopardy standards” developed through the ESA-mandated consultation process. Ocean fisheries are managed according to zones reflecting the distribution of salmon stocks and are structured to allow and encourage capture of hatchery-produced stocks while avoiding depressed natural stocks. The Columbia River, on the Oregon/Washington border; the Klamath River in

Southern Oregon; and the Sacramento River in Central California support the largest runs of returning salmon.

California accounts for most landings and revenues of salmon caught in the coastal management areas, followed by Oregon and Washington (Table 3-35). However, Washington landings in Puget Sound and other non-coastal areas substantially exceed the total coastal landings. Most of the top 10 ports for quantity of landings occur in Washington (Table 3-36), but the top ports in terms of revenues occur more evenly distributed by state.

The salmon troll fishery has a small incidental catch of Pacific halibut and groundfish, including yellowtail rockfish. The historical data show that salmon troll trips that did not land halibut had a higher range of groundfish landings (11-149 mt) than troll trips that landed halibut (1-19 mt). However, looking at groundfish catch frequency, either by vessel or trips, reveals that groundfish are caught more often by vessels or on trips catching halibut. To account for yellowtail rockfish landed incidentally while not promoting targeting on the species, federal managers have allowed salmon trollers to land up to one pound of yellowtail per two pounds of salmon in 2001, not to exceed 300 pounds per month (north of Cape Mendocino).

Table 32. Salmon Landings and Exvessel Revenue by Area, State, and Year (LBS and USD)

			YEAR			
Area	State	Data type	2000	2001	2002	2003
Coastal Management Areas	CA	Landed weight (lbs)	5,143,030	2,407,615	4,941,537	6,382,942
		Exvessel revenue (\$)	10,325,395	4,772,551	7,643,076	12,166,622
	OR	Landed weight (lbs)	1,563,697	2,960,716	3,501,154	3,667,155
		Exvessel revenue (\$)	3,069,828	4,736,557	5,388,352	7,198,494
	WA	Landed weight (lbs)	416,030	1,090,350	1,348,292	1,443,320
		Exvessel revenue (\$)	566,873	1,096,778	1,313,661	1,594,448
Other Management Areas	OR	Landed weight (lbs)	1,340,819	1,855,600	2,089,757	2,438,378
		Exvessel revenue (\$)	961,419	1,125,372	1,543,793	1,586,972
	WA	Landed weight (lbs)	12,750,614	28,791,819	32,904,386	31,122,453
		Exvessel revenue (\$)	9,772,895	11,298,116	12,013,803	11,100,583
Total Landed weight (lbs)			21,214,190	37,106,100	44,785,126	45,054,248
Total Exvessel revenue (\$)			24,696,410	23,029,373	27,902,685	33,647,119

Source: PacFIN ftl table. August 2004

Note: "Other management areas" includes inside waters such as Puget Sound and Columbia River

Table 33. Top 15 Ports for Salmon Landings and Exvessel Revenue (2000–2003)

Rank	Top 15 Ports by Weight	Top 15 Ports by Exvessel Revenue
1	BELLINGHAM BAY	NEWPORT
2	SEATTLE	FORT BRAGG
3	SHELTON	BELLINGHAM BAY
4	COLUMBIA RIVER PORTS - OREGON	CHARLESTON (COOS BAY)
5	TAHOLAH	BODEGA BAY
6	LACONNER	SAN FRANCISCO
7	NEWPORT	COLUMBIA RIVER PORTS - OREGON
8	EVERETT	SHELTON
9	FORT BRAGG	PRINCETON / HALF MOON BAY
10	TACOMA	SEATTLE
11	BLAINE	MOSS LANDING
12	COPALIS BEACH	TACOMA
13	PORT ANGELES	TAHOLAH
14	BODEGA BAY	PORT ANGELES
15	CHARLESTON (COOS BAY)	BLAINE

Source: PacFIN ftl tables. August 2004

Pacific Halibut

Pacific halibut (*Hippoglossus stenolepis*), in the family Pleuronectidae, range along the continental shelf in the North Pacific and Bering Sea in waters of 40 to 200 m depth. They have flat, diamond-shaped bodies and may migrate long distances. Juvenile halibut, mostly shorter than the legal size limit, tend to migrate from north to south until they reach maturity. Adult halibut migrate from shallow summer feeding grounds to deeper winter spawning grounds. Most adult fish return to the same feeding grounds each summer where most commercial and recreational fishing occurs.

The bilateral (U.S./Canada) IPHC recommends conservation regulations for Pacific halibut, and the governments of Canada and the U.S. implement the regulations in their own waters. The IPHC requires a license to participate in the commercial Pacific halibut fishery in waters off Washington, Oregon, and California (Area 2A). Area 2A licenses, issued for the directed commercial fishery, have decreased from 428 in 1997 to 215 in 2004. The Pacific and North Pacific Fishery Management Councils have responsibility for allocation in Council waters within the IPHC management regime. The Pacific Halibut Catch Sharing Plan (CSP) for Area 2A specifies allocation agreements of the Council, the states of Washington, Oregon, and California, and the Pacific halibut treaty tribes. The CSP specifies recreational and commercial fisheries for Area 2A. The commercial sector has both a treaty and non-treaty components. Regulations limit the directed non-treaty commercial fishery in Area 2A to south of Point Chehalis, Washington, Oregon, and California. Commercial landings have ranged from about 0.5 to 1.0 million pounds (head on dressed weight) and \$1.5 to \$2.3 million. Washington accounts for the majority of the highest-producing ports for landed weight and revenue. In the non-treaty commercial sector, the directed halibut fishery receives an allocation of 85% of the harvest and the salmon troll fishery receives 15% to cover incidental catch. The limited entry primary sablefish fishery north of Point Chehalis, Washington (46° 53' 18" N latitude) may retain halibut when the Area 2A total allowable halibut catch (TAC) is above 900,000 pounds. In 2003, the TAC was above this level, and the allocation was 70,000 pounds. Final landings for this fishery in 2003 were 65,325 pounds; 56% (47,946 pounds) of the allocation was harvested.

Table 34. Pacific Halibut Commercial Landings and Exvessel Revenue by Year and Gear (LBS and USD)

		YEAR			
Gear Group	Data Type	2000	2001	2002	2003
Hook and Line	Landed weight (lbs)	519,645	745,500	949,274	807,131
	Exvessel revenue (\$)	1,358,462	1,578,914	1,941,603	2,226,318
Troll	Landed weight (lbs)	25,574	37,639	42,811	48,416
	Exvessel revenue (\$)	62,210	78,409	81,505	107,640
Total Landed weight (lbs)		545,219	783,139	992,085	855,547
Total Exvessel Revenue (\$)		1,420,671	1,657,323	2,023,108	2,333,958

Source: PacFIN ftl table. August 2004

Table 35. Top 15 Ports for Pacific Halibut Landings and Exvessel Revenue (2000–2003)

Rank	Top 15 Ports by Weight	Top 15 Ports by Exvessel Revenue
1	NEAH BAY	NEAH BAY
2	NEWPORT	NEWPORT
3	PORT ANGELES	PORT ANGELES
4	TAHOLAH	BELLINGHAM BAY
5	BELLINGHAM BAY	TAHOLAH
6	LAPUSH	LAPUSH
7	ASTORIA	ASTORIA
8	WESTPORT	WESTPORT
9	CHARLESTON (COOS BAY)	CHARLESTON (COOS BAY)
10	EVERETT	BLAINE
11	BLAINE	EVERETT
12	FLORENCE	FLORENCE
13	PORT ORFORD	GARIBALDI (TILLAMOOK)
14	GARIBALDI (TILLAMOOK)	CHINOOK
15	CHINOOK	PORT ORFORD

Source: PacFIN ftl table. August 2004

California Halibut

California halibut (*Paralichthys californicus*), a left-eyed flatfish of the family Bothidae, range from Northern Washington at approximately the Quileute River to southern Baja California, Mexico (Eschmeyer et al. 1983). The center of distribution occurs south of Oregon. They predominantly associate with sand substrates from nearshore areas just beyond the surf line to about 183 m. California halibut feed on fishes and squids and can take their prey well off the bottom.

The commercial California halibut fishery extends from Bodega Bay in northern California to San Diego in Southern California, and across the international border into Mexico. California halibut, a state-managed species, is targeted with hook-and-line, setnets and trawl gear, all of which intercept groundfish. Federal regulations allow fishing with 4.5-inch minimum mesh size trawl in federal waters, but California regulations prohibit trawling within state waters, except in the designated “California halibut trawl grounds,” where a 7.5-inch minimum mesh size must be used during open seasons. Historically, California commercial halibut fishers have preferred setnets because of these restrictions, and predominantly use 8.5-inch mesh and maximum length of 9,000. These nets take most of the landings. Setnets are prohibited in certain designated areas, including a Marine Resources Protection Zone

(MRPZ), covering state waters (to 3 nm) south of Point Conception and waters around the Channel Islands to 70 fm, but extending seaward no more than one mile. In comparison to trawl and setnet landings, commercial hook-and-line catches are historically insignificant. Over the last decade they have ranged from 11% to 23% of total California halibut landings. Most of those landings were made in the San Francisco Bay area by salmon fishers mooching or trolling slowly over the ocean bottom (Kramer et al. 2001). Overall, the ports with highest California halibut landings occur in central and southern California.

Table 36. California Halibut Landings and Exvessel Revenue by Year and Gear (LBS and USD)

		YEAR			
Gear Group	Data type	2000	2001	2002	2003
Hook and Line	Landed weight (lbs)	118,519	124,241	166,307	208,887
	Exvessel revenue (\$)	366,478	398,222	523,217	654,537
Misc.	Landed weight (lbs)	C	C	C	C
	Exvessel revenue (\$)	C	C	C	C
Net	Landed weight (lbs)	380,105	319,235	255,720	181,439
	Exvessel revenue (\$)	1,122,396	981,323	820,973	601,822
Pot	Landed weight (lbs)	463	170	1,501	592
	Exvessel revenue (\$)	1,225	531	3,594	2,419
Troll	Landed weight (lbs)	9,163	10,382	8,259	13,735
	Exvessel revenue (\$)	21,241	24,687	18,784	29,589
Trawl	Landed weight (lbs)	277,878	377,094	451,186	342,609
	Exvessel revenue (\$)	728,537	1,076,334	1,276,334	912,487
Shrimp Trawl	Landed weight (lbs)	63,947	66,634	55,534	77,324
	Exvessel revenue (\$)	214,903	226,478	203,011	326,085
Total Landed weight (lbs)		850,075	897,756	938,507	824,586
Total Exvessel revenue (\$)		2,454,780	2,707,575	2,845,913	2,526,939

Source: PacFIN ftl table. August 2004

Note: totals exclude confidential data

Table 37. Top 15 Ports for California Halibut Landings and Exvessel Revenue (2000–2003)

Rank	Top 15 Ports by Weight	Top 15 Ports by Exvessel Revenue
1	SAN FRANCISCO	SAN FRANCISCO
2	PRINCETON / HALF MOON BAY	VENTURA
3	VENTURA	PRINCETON / HALF MOON BAY
4	SANTA BARBARA	SANTA BARBARA
5	SAN PEDRO	TERMINAL ISLAND
6	TERMINAL ISLAND	SAN PEDRO
7	OXNARD	OXNARD
8	MOSS LANDING	PORT HUENEME
9	SANTA CRUZ	OCEANSIDE
10	AVILA	SANTA CRUZ
11	PORT HUENEME	AVILA
12	OCEANSIDE	MOSS LANDING
13	MONTEREY	SAN DIEGO
14	SAN DIEGO	MONTEREY
15	MORRO BAY	MORRO BAY

Source: PacFIN ftl table. August 2004

California Sheephead

California sheephead (*Semicossyphus pulcher*), a large member of the wrasse family Labridae, range from Monterey Bay south to Guadalupe Island in central Baja California and the Gulf of California, in Mexico, but are uncommon north of Point Conception. They are associated with rocky bottom habitats, particularly in kelp beds to 55 m, but more commonly at depths of 3 m to 30 m. They can live to 50 years of age and a maximum length of 91 cm (16 kg). Like some other wrasse species, California sheephead start life as a female, and changing to a male at about 30 cm in length.

Pot fishermen account for well over half of the total catch and revenues of Sheephead (Table 3-41), followed by hook and line gear. Nets and other gears take minimal amounts of Sheephead. The top 15 ports in California have a similar order of landed weight and revenue (Table 3-42)

Table 38. Landings and Exvessel Revenue of California Sheephead by State, Gear, and Year (LBS and USD)

			YEAR			
State	Gear	Data type	2000	2001	2002	2003
California	Hook and Line	Landed weight (lbs)	33,211	23,928	22,698	24,587
		Exvessel revenue (\$)	93,186	73,996	66,304	82,449
	Other Gears	Landed weight (lbs)	1,506	1,268	1,199	2,677
		Exvessel revenue (\$)	4,663	2,860	4,100	10,131
	Net	Landed weight (lbs)	3,067	3,097	1,432	474
		Exvessel revenue (\$)	5,897	3,401	1,388	1,317
	Pot	Landed weight (lbs)	136,161	121,941	95,719	79,618
		Exvessel revenue (\$)	490,773	437,409	339,741	292,673
Total Landed weight (lbs)			173,945	150,234	121,048	107,356
Total Exvessel revenue (\$)			594,519	517,666	411,532	386,570

Source: PacFIN ftl table. August 2004

Table 39. Top 15 Ports for Sheephead Landings and Exvessel Revenue (2000–2003)

Rank	Top 15 Ports by Weight	Top 15 Ports by Exvessel Revenue
1	OXNARD	OXNARD
2	SAN DIEGO	SAN DIEGO
3	SANTA BARBARA	TERMINAL ISLAND
4	TERMINAL ISLAND	SANTA BARBARA
5	NEWPORT BEACH	NEWPORT BEACH
6	VENTURA	MISSION BAY
7	MISSION BAY	VENTURA
8	OCEANSIDE	OCEANSIDE
9	DANA POINT	DANA POINT
10	SAN PEDRO	SAN PEDRO
11	POINT LOMA	POINT LOMA
12	LONG BEACH	LONG BEACH
13	MORRO BAY	PLAYA DEL REY
14	PLAYA DEL REY	REDONDO BEACH
15	REDONDO BEACH	MORRO BAY

Source: PacFIN ftl table. August 2004

Coastal Pelagic Species

Coastal pelagic species (CPS) are schooling fish, not associated with the ocean bottom, that migrate in coastal waters. These species include: northern anchovy (*Engraulis mordax*), Pacific sardine (*Sardinops sagax*), Pacific (chub) mackerel (*Scomber japonicus*), jack mackerel (*Trachurus symmetricus*), and market squid (Decapoda). Until 1999, northern anchovy was managed under the Council's Northern Anchovy FMP. Amendment 8 to the Northern Anchovy FMP, implemented in December 1999, brought the remaining CPS species under federal management and renamed the FMP the Coastal Pelagic Species FMP.

Sardines inhabit coastal subtropical and temperate waters, and at times, have been the most abundant fish species in the California current. During times of high abundance, Pacific sardine range from the tip of Baja California, Mexico, to southeastern Alaska. During periods of low abundance, Pacific sardine do not occur in large quantities north of Point Conception, California. Pacific mackerel in the northeastern Pacific range from Banderas Bay, Mexico to southeastern Alaska, commonly from Monterey Bay, California to Cabo San Lucas, Baja California, and most abundant south of Point Conception, California. The central subpopulation of northern anchovy ranges from San Francisco, California to Punta Baja, Mexico. Jack mackerel range widely throughout the northeastern Pacific; however, much of their range lies outside the U.S. EEZ. Adult and juvenile market squid are distributed throughout the Alaska and California current systems, but most abundantly between Punta Eugenio, Baja California, Mexico, and Monterey Bay, Central California.

Stock assessments for Pacific sardine and Pacific mackerel from December 1999 and July 1999, respectively, indicate increasing relative abundance for both species. Pacific sardine biomass in U.S. waters was estimated to be 1,581,346 mt in 1999; Pacific mackerel biomass (in U.S. waters) was estimated to be 239,286 mt. Pacific sardine landings for the directed fisheries off California and Baja

California, Mexico, reached the highest level in recent history during 1999, with a combined total of 115,051 mt harvested. In 1998, near-record landings of 70,799 mt of Pacific mackerel occurred for the combined directed fisheries off California and Baja California.

Population dynamics for market squid are poorly understood, and annual commercial catch varies from less than 10,000 mt to 90,000 mt. They are thought to have an annual mortality rate approaching 100%, which means the adult population is almost entirely new recruits and successful spawning is crucial to future years' abundance. Amendment 10 to the CPS FMP describes and analyzes several approaches for estimating an MSY proxy for market squid. Council adopted Amendment 10 in June 2002 and NMFS implemented the plan on January 27, 2003 (68 FR 3819).

These fisheries are concentrated in California (Table 3-43), but CPS fishing also occurs in Washington and Oregon. Vessels using round haul gear (purse seines and lampara nets) account for 99% of total CPS landings and revenues per year (Table 3-44). In Washington, the Emerging Commercial Fishery regulations provides for the sardine fishery as a trial commercial fishery. The trial fishery targets sardines, but also lands anchovy, mackerel, and squid. Regulations limit the fishery to vessels using purse seine gear; prohibits fishing inside of three miles, and requires logbooks. Eleven of the 45 permits holders participated in the fishery in 2000, landing 4,791 mt of sardines (Robinson 2000). Three vessels accounted for 88% of the landings. Of these, two fished out of Ilwaco and one out of Westport. Oregon manages the sardine fishery under the Development Fishery Program under annually-issued permits, which have ranged from 15 in 1999 and 2000 to 20 in 2001. Landings, almost all by purse seine vessels, have rapidly increased in Oregon: from 776 mt in 1999 to 12,798 mt in 2001. The number of vessels increased from three to 18 during this period (McCrae 2001; McCrae 2002 personal communication). The Southern California round haul fleet is the most important sector of the CPS fishery in terms of landings, and most of the highest production ports occur in this area (Table 3-45). This fleet is primarily based in Los Angeles Harbor, along with fewer vessels in the Monterey and Ventura areas. The fishery harvests Pacific bonito, market squid, and tunas as well as CPS. The fleet consists of about 40 active purse seiners averaging 20 m in length. Approximately one-third of this fleet are steel-hull boats built during the last 20 years, the remainder are wooden-hulled vessels built from 1930 to 1949, during the boom of the Pacific sardine fleet. Because stock sizes of these species can radically change in response to ocean conditions, the CPS FMP takes a flexible management approach. Pacific mackerel and Pacific sardine are actively managed through annual harvest guidelines based on periodic assessments. Northern anchovy, jack mackerel, and market squid are monitored through commercial catch data. If appropriate, one third of the harvest guideline is allocated to Washington, Oregon, and northern California (north of 35°40' N latitude) and two-thirds is allocated to Southern California (south of 35°40' N latitude). An open access CPS fishery is in place north of 39°N latitude and a limited entry fishery is in place south of 39° N latitude. The Council does not set harvest guidelines for anchovy, jack mackerel, or market squid (PFMC 1998).

Table 40. CPS Landings and Exvessel Revenue by Area, State, and Year (LBS and USD)

			YEAR			
Area	State	Data type	2000	2001	2002	2003
Coastal Management Areas	CA	Landed weight (lbs)	465,666,430	376,633,573	316,754,663	182,994,919
		Exvessel revenue (\$)	40,179,911	29,373,729	27,852,840	29,261,203
	OR	Landed weight (lbs)	21,629,154	29,337,380	50,396,664	56,500,887
		Exvessel revenue (\$)	1,173,218	1,726,387	2,835,693	3,016,660
	WA	Landed weight (lbs)	10,937,156	25,573,818	35,995,417	26,872,582
		Exvessel revenue (\$)	716,632	1,394,002	2,044,254	1,546,569
Other Management Areas	OR	Landed weight (lbs)	C	C	C	C
		Exvessel revenue (\$)	C	C	C	C
	WA	Landed weight (lbs)	530,364	813,484	1,196,872	1,070,620
		Exvessel revenue (\$)	208,419	297,702	529,434	510,373
Total Landed weight (lbs)			498,763,104	432,358,255	404,343,616	267,439,008
Total Exvessel revenue (\$)			42,278,180	32,791,820	33,262,222	34,334,805

Source: PacFIN ftl table. August 2004

Note: C represents data restricted due to confidentiality

Totals do not include confidential data

“Other management areas” includes inside waters such as Puget Sound and Columbia River

Table 41. CPS Landings and Exvessel Revenue by Year and Gear(LBS and USD)

		YEAR			
Gear Group	Data type	2000	2001	2002	2003
Hook and Line	Landed weight (lbs)	447,269	132,292	46,697	135,851
	Exvessel revenue (\$)	64,810	63,396	30,017	53,557
Misc	Landed weight (lbs)	238,310	53,720	90,661	141,291
	Exvessel revenue (\$)	82,093	390,882	621,647	463,864
Net	Landed weight (lbs)	496,714,839	430,478,604	404,186,770	266,878,952
	Exvessel revenue (\$)	42,035,766	32,142,853	32,605,922	33,761,365
Pot	Landed weight (lbs)	100,375	1,240	347	57,592
	Exvessel revenue (\$)	10,194	398	126	15,534
Troll	Landed weight (lbs)	645,533	307,434	558	43,777
	Exvessel revenue (\$)	57,140	11,811	666	15,701
Trawl	Landed weight (lbs)	626,541	1,384,594	21,999	181,009
	Exvessel revenue (\$)	28,150	182,129	2,734	24,105
Shrimp Trawl	Landed weight (lbs)	1,086	371	1,255	536
	Exvessel revenue (\$)	569	351	1,577	678
Total Landed weight (lbs)		498,773,953	432,358,255	404,348,287	267,439,008
Total Exvessel revenue (\$)		42,278,722	32,791,820	33,262,689	34,334,805

Source: PacFIN ftl table. August 2004

Table 42. Top 15 Ports for CPS Landings and Exvessel Revenue (2000–2003)

Rank	Top 15 Ports by Weight	Top 15 Ports by Exvessel Revenue
1	SAN PEDRO	SAN PEDRO
2	PORT HUENEME	PORT HUENEME
3	TERMINAL ISLAND	MOSS LANDING
4	MOSS LANDING	TERMINAL ISLAND
5	ASTORIA	VENTURA
6	VENTURA	ASTORIA
7	ILWACO	SAN FRANCISCO
8	MONTEREY	MONTEREY
9	SAN FRANCISCO	ILWACO
10	WESTPORT	SAUSALITO
11	SAUSALITO	PRINCETON / HALF MOON BAY
12	PRINCETON / HALF MOON BAY	WESTPORT
13	SANTA BARBARA	TACOMA
14	LONG BEACH	MARSHALL
15	MARSHALL	SANTA BARBARA

Source: PacFIN ftl table. August 2004

Sea Cucumber

Commercial fisheries target two sea cucumber species: the California sea cucumber (*Parastichopus californicus*), also known as the giant red sea cucumber, and the warty sea cucumber (*P. parvimensis*) (Rogers-Bennett and Ono 2001). These species are tube-shaped Echinoderms, a phylum that also includes sea stars and sea urchins. The California sea cucumber occurs as far north as Alaska; the warty sea cucumber is uncommon north of Point Conception and does not occur north of Monterey. Both species live in the intertidal zone to as deep as 300 feet (the California sea cucumber). These bottom-dwelling organisms feed on detritus and small organisms found in the sand and mud. Because sea cucumbers consume bottom sediment and remove food from it, they can alter the substrate in areas where they are concentrated. They can also increase turbidity as they excrete ingested sand or mud particles. Sea stars, crabs, various fishes, and sea otters prey on sea cucumbers. They spawn by releasing gametes into the water column, and spawning occurs simultaneously for different segments of a population. During development, larvae go through several planktonic stages, and settle to the bottom two to three months after fertilization of the egg. Little is known about the population status of these two species; their patchy distribution makes assessment difficult. However, density surveys suggest abundance has declined since the late 1980s. The decline may have resulted from a commercial fishery for these species that began in the late 1970s and expanded substantially after 1990.

California implemented a permit program in 1992. In 1997 the state established separate, limited entry permits for the dive and trawl sectors. Permit rules encourage transfer to the dive sector, and this has led to growth in this sector, which now accounts for 80% of landings. There are currently 113 sea cucumber dive permittees and 36 sea cucumber trawl permittees. Many commercial sea urchin and/or recreational abalone free-divers also hold sea cucumber permits and began targeting sea cucumbers more heavily beginning in 1997. At up to \$20 per pound wholesale for processed sea cucumbers, there is a strong incentive to participate in this fishery. California fishers account for the majority of sea cucumbers by weight and value, followed by Washington fishers (Table 3-46); Oregon has too few participants for public release of data.

Sea cucumbers are managed by the states. Along the West Coast, sea cucumbers are harvested by diving or trawling (Table 3-47). Only the trawl fishery for sea cucumbers lands an incidental catch of groundfish. The warty sea cucumber is fished almost exclusively by divers. The California sea cucumber is caught principally by trawling in Southern California, but is targeted by divers in Northern California. The top ports for landed weight and ex-vessel revenue occur roughly equally in California and Washington (Table 3-48).

Sea cucumber fisheries have expanded worldwide and, on this coast, a dive fishery for warty sea cucumbers occurs in Baja California, Mexico, and dive fisheries for California sea cucumbers occur in Washington, Oregon, Alaska, and British Columbia, Canada (Rogers-Bennett and Ono 2001). In Washington, the sea cucumber fishery only occurs inside Puget Sound and the Strait of Juan de Fuca. Most of the harvest is taken by diving, although the tribes can also trawl for sea cucumbers in these waters.

Table 43. Sea Cucumber Landings and Exvessel Revenue by Area, State, and Year (LBS and USD)

			YEAR			
Area	State	Data type	2000	2001	2002	2003
Coastal Management Areas	CA	Landed weight (lbs)	643,310	717,695	946,810	758,569
		Exvessel revenue (\$)	606,578	584,970	801,276	687,854
	OR	Landed weight (lbs)	C	C		C
		Exvessel revenue (\$)	C	C		C
Other Management Areas	WA	Landed weight (lbs)	605,755	661,657	549,127	438,707
		Exvessel revenue (\$)	836,720	903,570	598,820	560,533
Total Landed weight (lbs)			1,249,065	1,379,352	1,495,937	1,197,276
Total Exvessel revenue (\$)			1,443,297	1,488,540	1,400,096	1,248,387

Source: PacFIN ftl table. August 2004

Note: C represents data restricted due to confidentiality

“Other management areas” includes inside waters such as Puget Sound and Columbia River

Table 44. Sea Cucumber Landings and Exvessel Revenue by Year and Gear (LBS and USD)

		YEAR			
Gear aggregation	Data type	2000	2001	2002	2003
Misc. (including dive gear)	Landed weight (lbs)	574,689	465,804	660,598	466,855
	Exvessel revenue (\$)	558,029	419,318	610,742	475,262
Other Gears	Landed weight (lbs)	674,667	913,583	835,339	731,109
	Exvessel revenue (\$)	885,777	1,069,291	789,354	774,084
Total Landed weight (lbs)		1,249,065	1,379,352	1,495,937	1,197,276
Total Exvessel revenue (\$)		1,443,297	1,488,540	1,400,096	1,248,387

Source: PacFIN ftl table. August 2004

Note: C represents data restricted due to confidentiality

“Other management areas” includes inside waters such as Puget Sound and Columbia River totals are equivalent to previous table to protect confidentiality

Table 45. Top 15 Ports for Sea Cucumber Landings and Exvessel Revenue (2000–2003)

Rank	Top 15 Ports by Weight	Top 15 Ports by Exvessel Revenue
1	OXNARD	OXNARD
2	SANTA BARBARA	BLAINE
3	BLAINE	ANACORTES
4	ANACORTES	SANTA BARBARA
5	TERMINAL ISLAND	TERMINAL ISLAND
6	POULSBO	BELLINGHAM BAY
7	BELLINGHAM BAY	POULSBO
8	SEATTLE	SEATTLE
9	TACOMA	TACOMA
10	VENTURA	LACONNER
11	LACONNER	VENTURA
12	PUGET ISLAND	PUGET ISLAND
13	FRIDAY HARBOR	FRIDAY HARBOR
14	SAN PEDRO	SAN PEDRO
15	MISSION BAY	PORT TOWNSEND

Source: PacFIN ftl table. August 2004

Spot Prawn

Spot prawn (*Pandalus platyceros*) are the largest of the pandalid shrimp and range from Baja California, Mexico, north to the Aleutian Islands and west to the Korean Strait (Larson 2001). They inhabit rocky or hard bottoms including coral reefs, glass sponge reefs, and the edges of marine canyons. They have a patchy distribution, which may result from active habitat selection and larval transport. Spot prawns are hermaphroditic, first maturing as males at about three years of age. They enter a transition phase after mating at about four years of age when they metamorphose into females.

Spot prawns are targeted with both trawl and pot gear. These fisheries are state-managed. For the purposes of managing incidentally-caught groundfish, the trawl fishery is categorized in the open access sector. California has the largest and oldest trawl fishery with about 54 vessels operating from Bodega

Bay south to the U.S./Mexico border. California has the top 15 ports for landed weight and ex-vessel revenue. (Most vessels operate out of Monterey, Morro Bay, Santa Barbara, and Ventura, although some Washington-based vessels participate in this fishery during the fall and winter.) Standard gear is a single-rig shrimp trawl with roller gear, varying in size from eight-inch disks to 28-inch tires. Washington State phased out its trawl fishery by converting its trawl permits to pot/trap permits in 2003. California instituted area and season closures for the trawl fleet in 1984 to protect spot prawns during their peak egg-bearing months of November through January. In 1994, the trawl area and season closure was expanded to include the entire Southern California Bight. As of 2003, the trawl fishery was closed. These closures, along with the development of ridgeback prawn, sea cucumber, and other fisheries, and also greater demand for fresh fish, have kept spot prawn trawl landings low and facilitated growth of the trap fishery. The trap fishery began in 1985 with a live prawn segment developing subsequently. The fleet operates from Monterey Bay, where six boats are based, to Southern California, where a 30 to 40 boat fleet results in higher production. Fishers in both fishing areas set traps at depths of 600 feet to 1,000 feet along submarine canyons or along shelf breaks. Between 1985 and 1991 trapping accounted for 75% of statewide landings; trawling accounted for the remaining 25% (Larson 2001). Landings continued to increase through 1998, when they reached a historic high of 780,000 pounds. Growth in participation and a subsequent drop in landings led to the development of a limited entry program, which is still in the process of being implemented. Other recent regulations include closures, trap limits, bycatch reduction measures for the trawl fishery, and an observer program.

Table 46. Spot Prawn Landings and Exvessel Revenue by Year and Gear in California (LBS and USD)

		Year			
Gear	Data type	2000	2001	2002	2003
Pot	Landed weight (lbs)	180,339	218,813	175,497	159,168
	Exvessel revenue (\$)	1,646,474	1,993,004	1,607,681	1,505,684
Trawl (all trawl types)	Landed weight (lbs)	266,682	203,346	218,067	6,841
	Exvessel revenue (\$)	2,188,968	1,709,452	1,759,197	61,364
Total Landed weight (lbs)		447,021	422,159	393,564	166,009
Total Exvessel Revenue (\$)		3,835,442	3,702,456	3,366,877	1,567,049

Source: PacFIN ftl table. August 2004

Note: Spot prawn landings do not show up specifically in landed catch data for WA and OR

Table 47. Top 15 Ports for Spot Prawn Landings and Exvessel Revenue in California (2000–2003)

Rank	Top 15 Ports by Weight	Top 15 Ports by Exvessel Revenue
1	MORRO BAY	MORRO BAY
2	MONTEREY	MONTEREY
3	OXNARD	OXNARD
4	VENTURA	VENTURA
5	DANA POINT	DANA POINT
6	TERMINAL ISLAND	TERMINAL ISLAND
7	SANTA BARBARA	OCEANSIDE
8	OCEANSIDE	SANTA BARBARA
9	SAN DIEGO	MOSS LANDING
10	RICHMOND	SAN DIEGO
11	MOSS LANDING	RICHMOND
12	SAN FRANCISCO	SAN FRANCISCO
13	FORT BRAGG	FORT BRAGG
14	BODEGA BAY	BODEGA BAY
15	HUNTINGTON BEACH	MISSION BAY

Source: PacFIN ftl table. August 2004

Sea Urchin

Sea urchins are harvested along the California coast, the Oregon coast, and the Strait of Juan de Fuca region of Washington. Both red and green sea urchins are found along the West Coast. The red sea urchin usually occupies shallow waters, from the mid to low intertidal zones to depths in excess of 164 feet, but occur as deep as 410 feet (McCauley and Carey 1967). Individuals prefer rocky substrates, particularly ledges and crevices, and avoid sand and mud (Kato and Schroeter 1985).

Red sea urchins have life spans of at least 30 years. In southern California, sea urchins feed on the giant kelp (*Macrocystis pyrifera*) (Leighton 1965). In northern California, sea urchin feed on bull and brown kelp (Parker and Kalvass 1992).

The sea urchin fishery first began in the 1970s in response to demand for sea urchin in the Japanese sushi market. Prior to the development of the fishery, sea urchins were regarded as a nuisance by kelp harvesters due to their impact on the kelp resource. Sea urchins are primarily harvested by persons using dive gear, and in California, landings are prevalent during the winter months in response to peak demand during the Japanese holiday season.

West Coast sea urchins are commercially harvested by divers using hookah diving gear (Table 3-52), consisting of a low-pressure air compressor that feeds air through a hose from the vessel to the divers (University of California Extension 1995). Sea urchins are targeted at depths between 5 and 100 feet, with most dives in the 20 to 60 foot range. Sea urchins are harvested from the ocean bottom with a hand-held rake or hook and put into a hoop net bag or wire basket. The basket is winched onto the boat and emptied into a larger net bag (University of California Extension 1995). In areas far from port, a larger pick-up vessel may take the catch from several harvesting vessels back to port (Parker and Kalvass 1992). Most of the top ports for landing weight and ex-vessel revenue occur in California, with several in Washington.

Table 48. Landings and Exvessel Revenue by Area, State, and Year (LBS and USD)

			YEAR			
Area	State	Data type	2000	2001	2002	2003
Coastal Management Areas	CA	Landed weight (lbs)	15,199,851	13,123,830	13,957,127	10,769,868
		Exvessel revenue (\$)	15,057,844	11,686,980	10,218,060	7,699,447
	OR	Landed weight (lbs)	983,556	1,258,957	812,395	143,727
		Exvessel revenue (\$)	682,484	802,224	347,879	60,282
Other Management Areas	CA	Landed weight (lbs)	C	C	C	C
		Exvessel revenue (\$)	C	C	C	C
	WA	Landed weight (lbs)	940,707	757,465	538,489	387,432
		Exvessel revenue (\$)	782,394	559,099	461,781	289,767
Total Landed weight (lbs)			17,124,114	15,140,252	15,309,330	11,301,027
Total Exvessel revenue (\$)			16,522,723	13,048,302	11,028,776	8,049,496

Source: PacFIN ftl table. August 2004

Note: "Other management areas" includes inside waters such as Puget Sound and Columbia River

Table 49. Sea Urchin Landings and Exvessel Revenue by Area, Gear and Year (LBS and USD)

			YEAR			
Area	Gear Aggregation	Data type	2000	2001	2002	2003
Coastal Management Areas	Other Gears	Landed weight (lbs)	940,707	757,465	538,489	387,432
		Exvessel revenue (\$)	782,394	559,099	461,781	289,767
	Misc. (incl. dive gear)	Landed weight (lbs)	0	0	C	0
		Exvessel revenue (\$)	0	0	C	0
Other Management Areas	Other Gears	Landed weight (lbs)	23,635	7,533	8,254	17,859
		Exvessel revenue (\$)	21,231	6,824	8,372	13,427
	Misc. (incl. dive gear)	Landed weight (lbs)	16,159,772	14,375,254	14,761,268	10,895,736
		Exvessel revenue (\$)	15,719,098	12,482,380	10,557,567	7,746,301
Total Landed weight (lbs)			17,124,114	15,140,252	15,308,011	11,301,027
Total Exvessel revenue (\$)			16,522,723	13,048,302	11,027,720	8,049,496

Source: PacFIN ftl table. August 2004

Note: "Other management areas" includes inside waters such as Puget Sound and Columbia River. Totals exclude confidential data

Table 50. Top 15 Ports for Sea Urchin Landings and Exvessel Revenue (2000–2003)

Rank	Top 15 Ports by Weight	Top 15 Ports by Exvessel Revenue
1	SANTA BARBARA	SANTA BARBARA
2	TERMINAL ISLAND	TERMINAL ISLAND
3	OXNARD	OXNARD
4	FORT BRAGG	FORT BRAGG
5	POINT ARENA	SAN PEDRO
6	SAN PEDRO	POINT ARENA
7	ALBION	MISSION BAY
8	MISSION BAY	ALBION
9	BODEGA BAY	BODEGA BAY
10	PORT ORFORD	POINT LOMA
11	POINT LOMA	SEATTLE
12	SEATTLE	PORT ORFORD
13	DEPOE BAY	PORT TOWNSEND
14	PORT TOWNSEND	DEPOE BAY
15	CHARLESTON (COOS BAY)	DANA POINT

Source: PacFIN ftl table. August 2004

California Spiny Lobster Fishery

The California spiny lobster is found along the coast of California from the Morro Bay area, south to Rosalia Bay, Baja California, however the majority of the population is found south of Point Conception. This fishery is prosecuted by both commercial and recreational fishers with dive gear and with traps that are set on the ocean bottom and are attached to buoys that float on the surface.

The fishery is managed through the use of restricted access, size limits, escape ports on traps, and seasonal closures. Size limits are used to protect juveniles, and seasonal closures are used to protect egg-bearing females. In addition, marine protected areas implemented around the Channel Islands have reduced the amount of area accessible to fishers targeting spiny lobster.

According to information from the University of Santa Barbara, Donald Bren School of Environmental Science and Management, the annual catch of California spiny lobster in the southern California area is less than 500,000 lbs annually. However, the exvessel price for spiny lobster typically exceeds 6 dollars per pound, meaning the fishery typically generates more than 2 million dollars annually at the vessel level.

Landings of California Spiny Lobster by Year and Area

Year	Fishing Area	Total
2000	Los Angeles County Coastal	20,763
	Northern Channel Islands	56,756
	Orange County Coastal	57,894
	San Diego County Coastal	87,671
	Santa Barbara County Coastal	20,896
	Southern Channel Islands and Outer Banks	78,044
	Ventura County Coastal	5,011
2000 Total		327,035
2001	Los Angeles County Coastal	39,159
	Northern Channel Islands	66,506
	Orange County Coastal	68,503
	San Diego County Coastal	170,042
	Santa Barbara County Coastal	30,842
	Southern Channel Islands and Outer Banks	89,796
	Ventura County Coastal	7,740
2001 Total		472,588
2002	Los Angeles County Coastal	39,770
	Northern Channel Islands	90,362
	Orange County Coastal	49,602
	San Diego County Coastal	140,188
	Santa Barbara County Coastal	35,289
	Southern Channel Islands and Outer Banks	82,021
	Ventura County Coastal	3,751
2002 Total		440,983
2003	Los Angeles County Coastal	40,822
	Northern Channel Islands	114,114
	Orange County Coastal	58,314
	San Diego County Coastal	117,679
	Santa Barbara County Coastal	37,910
	Southern Channel Islands and Outer Banks	100,671
	Ventura County Coastal	6,158
2003 Total		475,668

Source: University of California Santa Barbara. July 2005. Donald Bren School of Environmental Science and Management. Collaborative Monitoring of the Spiny Lobster in the Channel Islands Marine Protected Areas. <http://fiesta.bren.ucsb.edu/~lobster/home/index.html>

3.2.2 Tribal Fisheries

West Coast treaty tribes in Washington have formal groundfish allocations for sablefish, black rockfish, and Pacific whiting. Members of four coastal treaty tribes participate in commercial, ceremonial, and subsistence fisheries off the Washington coast. Participants in the tribal commercial fisheries use similar gear to non-tribal fishers. Fish caught in the tribal commercial fishery are distributed through the same markets as non-tribal commercial catch.

Tribal fisheries also take several species for which they have no formal allocations, and some species for which no specific allocation has been determined. Rather than try to reserve specific allocations of these species, the tribes biennially recommend trip limits for some species to the Council, which tries to

accommodate these fisheries. Groundfish fishing by the tribes occurs primarily with hook and line and trawl.

Thirteen western Washington tribes possess and exercise treaty fishing rights to halibut, including the four tribes that possess treaty fishing rights to groundfish. Tribal halibut allocations are divided into a tribal commercial component and the year-round ceremonial and subsistence component.

In addition, the Makah tribe annually harvests a whiting allocation using mid-water trawl gear and take other groundfish in the process. Since 1996, a portion of the U.S. whiting OY has been allocated to the West Coast treaty tribes. The tribal allocation is subtracted from the whiting OY before allocation to the non-tribal sectors. Since 1999, the tribal allocation has been based on a sliding scale related to the U.S. whiting OY. To date, only the Makah tribe has fished on the tribal whiting allocation. Makah vessels fit with mid-water trawl gear have also been targeting widow rockfish and yellowtail rockfish in recent years.

All tribes participating in groundfish fisheries have longline vessels in their fleets, but only Makah has trawlers. Makah has the majority of longline vessels, followed by Quinault, Quileute, and Hoh.

Tribal treaty fisheries are place-oriented—limited to the adjudicated U&A areas. This results in immobile fisheries that cannot move to a new location if the resources or habitat are depleted. In addition, the Tribe and its fishermen have a view of ownership of their fishing grounds rooted in centuries of use and control of these grounds. This sense of ownership influences the fishing practices of the tribes. Because the tribes are limited in the areas they fish, they work to practice good stewardship.

Following this philosophy, the Makah has taken a cautious approach to development of its fisheries. In addition, the Makah is committed to meeting its co-management responsibilities in managing its portion of the in-common resource including working to stay within the harvest limits established by the Council for overfished and abundant stocks.

Currently, the Makah fleet is composed of 43 boats. Twenty-nine of the boats fish for salmon, sablefish, and halibut. These boats primarily fish from March to October. Ten of the boats are small bottom trawlers. The trawl fishery is open from January to December, but primarily the fishing is done from June to October. The mid-water whiting fleet is composed of four boats. Their season is from May to September.

In the Makah bottom trawl fishery, the Tribe adopted the small foot rope restrictions as a means to reduce rockfish bycatch and avoid areas where higher incidences of rockfish occur. In addition, the bottom trawl fishery is limited by overall foot rope length as a means of conducting a more controlled fishery. Harvest is restricted by time and area to focus on harvestable species while avoiding bycatch of other species. If bycatch of rockfish is above a set limit, the fishery is modified to stay within the bycatch limit.

The midwater trawl fishery has similar control measures. A trawl area must first be tested to determine the incidence of overfished rockfish species prior to opening the area to harvest. Vessels are provided guidelines for fishing techniques and operation of their net. Fishing effort is closely monitored by the on-board observer and harvest manager and changes or restrictions are implemented as needed to stay within the bycatch limits.

Managing in this manner is very demanding of both the fisheries management staff and the fishermen, but micro-management allows for efficient harvest of abundant species while minimizing bycatch of overfished species (Joner 2004, personal communication). In developing these trawl fisheries, the Makah have taken a cautious approach that requires testing of gear, area, vessels, and catch composition before

the fishery can proceed from one level to the next. In addition, a new or developing fishery must show that it can be conducted in a manner that protects existing fisheries.

Another example of the Tribe's commitment to good stewardship of its resources includes the bycatch reduction efforts in the Makah whiting fishery. Full retention of rockfish bycatch is required (as is the case in all Makah groundfish fisheries); the bycatch is processed for human consumption and forfeited to the Tribe for distribution to food banks and similar programs. This program avoided wastage and discards of bycatch species, created a disincentive to both the catcher vessels and processor and provides full accounting of bycatch in the fishery. This in turn has reduced bycatch levels of nearly all species.

These examples illustrate the Tribes commitment to sustainable harvest of its marine resources. Management and protection of EFH and HAPC will occur as the Tribes continue to respond to resource needs in their fisheries.

Table 51. Tribal Shoreside Landings and Exvessel Revenue by Species Group and Year

		Year				
Species Group	Data Type	2000	2001	2002	2003	2004
CPS	Landed weight (lbs)	C				
	Exvessel revenue (\$)	C				
Crab	Landed weight (lbs)	922,909	665,443	1,804,399	1,420,102	2,672,525
	Exvessel revenue (\$)	1,957,757	1,292,271	3,240,886	2,660,939	5,704,007
Groundfish	Landed weight (lbs)	1,152,546	1,274,750	1,675,078	11,808,437	18,689,384
	Exvessel revenue (\$)	2,625,809	2,589,479	2,034,776	3,639,098	4,082,579
HMS	Landed weight (lbs)		15,110	21,664	37,950	15,301
	Exvessel revenue (\$)		11,876	11,645	33,456	11,162
Other	Landed weight (lbs)	281,820	418,480	480,185	485,509	537,583
	Exvessel revenue (\$)	747,950	840,983	949,711	1,271,393	1,506,766
Salmon	Landed weight (lbs)	236,966	735,977	573,684	513,772	1,090,256
	Exvessel revenue (\$)	282,162	631,997	444,341	512,614	1,648,124
Shellfish	Landed weight (lbs)	C			C	C
	Exvessel revenue (\$)	C			C	C
Sum of weight (lbs)		2,594,241	3,109,760	4,555,010	14,265,770	23,005,049
Sum of revenue (lbs)		5,613,678	5,366,607	6,681,358	8,117,501	12,952,638

Source: PacFIN FTL table. September 2005

Note: Totals do not include confidential data

Table 52. Tribal Shoreside Landings by Gear Type and Year

		Year				
Gear Type	Data	2000	2001	2002	2003	2004
Hook and Line	Landed weight (lbs)	1,317,524	1,406,585	1,125,842	1,362,733	1,623,791
	Exvessel revenue (\$)	3,264,578	3,296,352	2,470,980	3,423,539	3,942,738
Misc.	Landed weight (lbs)	C			C	C
	Exvessel revenue (\$)	C			C	C
Net	Landed weight (lbs)	55,731	119,043	11,810	5,412	4,597
	Exvessel revenue (\$)	66,020	84,960	8,185	4,950	4,720
Pot	Landed weight (lbs)	943,559	665,443	1,804,399	1,420,102	2,672,525
	Exvessel revenue (\$)	2,022,219	1,292,271	3,240,886	2,660,939	5,704,007
Troll	Landed weight (lbs)	198,984	656,317	600,689	567,302	1,143,716
	Exvessel revenue (\$)	226,440	569,236	457,477	553,069	1,696,708
Trawl	Landed weight (lbs)	78,443	262,372	1,012,270	10,910,311	17,560,420
	Exvessel revenue (\$)	34,420	123,789	503,830	1,475,040	1,604,465
Total Sum of weight (lbs)		2,594,241	3,109,760	4,555,010	14,265,860	23,005,049
Total Sum of revenue (\$)		5,613,678	5,366,607	6,681,358	8,117,538	12,952,638

Source: PacFIN FTL table. September 2005

Note: Totals do not include confidential data

Table 53. Tribal At-Sea Catch by Year (Units are in Pounds)

	YEAR			
Species Aggregation	2000	2001	2002	2003
Other Fish	483,822	1,529,540	2,987,067	3,145,036
Pacific Whiting	13,781,245	13,404,002	48,045,527	51,706,192
Total	14,265,068	14,933,542	51,032,594	54,851,228

Source: PacFIN NPAC4900 table. February 2004

Table 54 Distribution of Vessels Engaged in Tribal Groundfish Fisheries

Treaty Tribe	Number of Vessels in Groundfish Fishery			Port
	Longline (length in ft)	Trawl (length in ft)	Total	
Makah	35 (33'-62')	10 (49'-62')	41 a/	Neah Bay
Hoh	1	-	1	La Push
Quileute	7	-	7	La Push
Quinault	10	-	10	West Port
a/ Four Makah vessels participate in both longline and trawl fisheries.				

Source: NMFS. 2004. Groundfish Bycatch Final Programmatic Environmental Impact Statement

3.2.3 Recreational Fisheries

Recreational fishing is an important economic contributor to the west coast in general, and to some communities specifically. The recreational fishing sector can be divided into two groups; the charter fleet and the private fleet. The private fleet is typically made up of vessels owned by residents living in or near areas where they fish. The charter fleet is a for-hire fleet that plays a large role in the tourism sector of many west coast communities, and opportunities to fish on a charter vessel can be a substantial draw for tourists considering a visit to the coast.

The distribution of resident and non-resident ocean anglers among the West Coast states in 2000, 2001, and 2002 demonstrates the importance of recreational fishing, especially in Southern California (Table 55). Southern California has more than twice the number of resident recreational marine anglers than the next most numerous region, Washington State. While most of the recreational anglers were residents of those states where they fished, a significant share were non-residents. Oregon had the largest share of non-resident ocean anglers in all three years.

Table 55. Estimated number of West Coast marine anglers: 2000 - 2002 (thousands)

Year/State	Total	State Residents	Non-Residents	% Non-Residents
2000				
Washington	497	450	47	9.50%
Oregon	365	285	80	21.90%
Northern California	-	388	-	
Southern California	-	1,097	-	
Total California	1,705	1,485	220	12.90%
2001				
Washington	915	861	54	5.90%
Oregon	601	505	97	16.10%
Northern California	-	961	-	
Southern California	-	1,838	-	
Total California	3,084	2,799	285	9.20%
2002				
Washington	1,493	1,399	94	6.30%
Oregon	1,056	845	211	20.00%
Northern California	-	2,022	-	
Southern California	-	3,709	-	
Total California	6,406	5,731	675	10.50%

source: Pacific Fishery Management Council. 2004. Proposed Acceptable Biological Catch and Optimum Yield Specifications and Management Measures for the 2005-2006 West Coast Groundfish Fishery. Draft Environmental Impact Statement.

Fishing effort is related to weather, with relatively more effort occurring in the milder months of summer, and relatively less in winter (Table 56). As might be expected, this effect is more pronounced in higher latitudes, although the reasons include opportunity as well as climate. Salmon seasons are longer in California than in Oregon, which in turn are longer than in Washington. Until recently, groundfish seasons were also more restrictive in Washington, with the lingcod season being closed from November through March.

Table 56. Total estimated West Coast recreational marine angler boat trips in 2003 by mode and region (thousands of angler trips)

State/Region	Boat Mode	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec	Annual Total
WA	Charter	0.0	1.2	16.0	37.8	6.1	0.0	61.1
	Private	22.0	19.5	57.2	32.9	5.0	0.0	136.5
	Total	22.0	20.6	73.2	70.7	11.1	0.0	197.6
OR	Charter	0.8	4.4	27.0	34.2	7.7	0.7	74.8
	Private	31.4	31.2	123.6	108.4	19.4	1.3	315.3
	Total	32.2	35.7	150.6	142.5	27.1	2.0	390.1
N. CA	Charter	3.4	11.3	24.1	73.3	33.0	3.3	148.4
	Private	75.9	83.9	332.5	502.8	211.5	278.2	1,485.0
	Total	79.4	95.2	356.7	576.1	244.6	281.5	1,633.4
S. CA	Charter	32.7	42.0	113.0	256.2	87.3	42.4	573.6
	Private	136.9	192.8	348.2	400.8	331.3	222.5	1,632.5
	Total	169.5	234.8	461.1	657.0	418.6	264.9	2,206.1
Total All States	Charter	36.9	58.9	180.1	401.5	134.1	46.4	857.9
	Private	266.2	327.4	861.5	1,044.9	567.2	502.0	3,569.3
	Total	303.1	386.2	1,041.6	1,446.4	701.3	548.4	4,427.2

source: Pacific Fishery Management Council. 2004. Proposed Acceptable Biological Catch and Optimum Yield Specifications and Management Measures for the 2005-2006 West Coast Groundfish Fishery. Draft Environmental Impact Statement.

Recreational fishing in the open ocean has generally been declining slightly since 1996 (Table 57); however, charter effort has decreased while private effort increased during that period. Part of this increase likely resulted from longer salmon seasons associated with increased abundance. Some effort shift from salmon to groundfish for example likely occurred prior to 1996 when salmon seasons were shortened.

Table 57. Trends in effort for recreational ocean fisheries in thousands of angler trips

Area	1996	1997	1998	1999	2000	2001a/	2002a/	2003b/
<u>Total Angler Trips</u>								
Washington	51	50	44	49	40	61	56	61
Oregon	54	65	57	60	87	70	62	75
North and Central CA	90	139	158	162	206	221	142	148
Southern CA	982	812	674	609	876	577	438	574
Total	1,177	1,066	933	880	1,218	927	843	858

source: Pacific Fishery Management Council. 2004. Proposed Acceptable Biological Catch and Optimum Yield Specifications and Management Measures for the 2005-2006 West Coast Groundfish Fishery. Draft Environmental Impact Statement.

a) The 2001 and 2002 estimates are not directly comparable to previous years due to differences in estimation methodology

b) Preliminary

Recreational Charter Industry

Table 56 shows the distribution of trips by boat mode and region in 2003. More than half of the charter vessel trips operated from California ports, demonstrating the importance of recreational fishing industry in that state.

Private Vessels and the Recreational Fishing Experience Market

Demand for recreational trips and estimates of the economic impacts resulting from recreational fishing are related to numbers of anglers. Reliable data are not available on the number of West Coast anglers targeting specific species. However, data are available on the total number of saltwater anglers, and it is evident the presence of opportunities to catch species other than directly targeted ones increases the propensity of anglers to fish and the value of the overall recreational fishing experience. In the U.S., over nine million anglers took part in 76 million marine recreational fishing trips in 2000. The West Coast accounted for about 22% of these participants and 12% of trips. 70% of West Coast trips were made off California, 19% off Washington, and 11% from Oregon (Gentner 2001).

3.2.4 Buyers and Processors

Excluding Pacific whiting delivered to at-sea processors, vessels participating in Pacific groundfish fisheries deliver to shore-based processors within Washington, Oregon, and California. Buyers are located along the entire coast; however, processing capacity has been consolidating in recent years. Several companies have left the West Coast or have chosen to quit the business entirely. Remaining companies have purchased some former plants (Research Group 2003), but other plants have remained inactive. This has led to trucking groundfish from certain ports to another community for processing. Therefore, landings do not necessarily indicate processing activity in those communities. However, examination of the species composition of landed catch by state can lead to inferences of some processor characteristics.

According to PacFIN data, in 2002 Oregon had the largest amount of groundfish landings (56%), followed by Washington (28%), and California (16%). In contrast, Oregon has the largest amount of exvessel revenue (40%), followed by California (32%) and Washington (22%), respectively. Oregon accounts for the majority of Pacific whiting landings, which creates a large difference between the percentage of landed catch and exvessel revenue because Pacific whiting has a relatively low price per pound. The relatively high amount of Pacific whiting being landed in Oregon may create a case where many processors must generate capacity to handle large quantities at a time. Groundfish processors in Washington may receive landings from Alaska fisheries. Depending on the amount of catch Washington processors can draw from Alaska fisheries, some groundfish processors may require the capacity to process large amounts of product. California processors concentrating on West Coast fisheries may focus on relatively smaller throughput of groundfish.

The seafood distribution chain begins with deliveries by the harvesters (exvessel landings) to the shoreside networks of buyers and processors, and includes the linkage between buyers and processors and seafood markets. In addition to shoreside activities, processing of certain species (e.g., Pacific whiting) also occurs offshore on factory ships. Several thousand entities have permits to buy fish on the West Coast. Of these, 1,780 purchased fish caught in the ocean area and landed on Washington, Oregon, or

California state fishtickets in the year 2000 (excluding tribal catch) and 732 purchased groundfish (PFMC 2004).³

According to PacFIN data, the number of unique companies buying groundfish along the West Coast has declined in recent years. This trend coincides with recent regulatory restrictions and diminished landings of higher valued species such as rockfish (Table 58). The number of buyers purchasing other species such as crab and salmon has been stable or increasing in recent years.

Table 58. Count of Fish Buyers by Year, Species Type, and State (not unique records)

State	Species Group	Year			
		2000	2001	2002	2003
CA	CPS	174	126	118	112
	Crab	298	306	291	351
	Groundfish	412	385	324	310
	HMS	233	241	222	199
	Other	558	515	510	505
	Salmon	277	225	269	273
	Shellfish	6	10	2	2
	Shrimp	154	126	129	107
OR	CPS	14	15	16	16
	Crab	67	77	81	83
	Groundfish	84	74	79	81
	HMS	96	112	125	138
	Other	90	91	103	94
	Salmon	104	134	143	150
	Shellfish	19	14	46	27
	Shrimp	36	36	30	26
WA	CPS	12	17	16	15
	Crab	125	125	158	168
	Groundfish	43	42	40	45
	HMS	37	39	55	53
	Other	109	102	98	106
	Salmon	189	218	219	213
	Shellfish	167	178	177	171
	Shrimp	75	72	72	80

Source: PacFIN ftl and ft tables. July 2004

Note: records are not unique buyers and should not be summed

3/ A "buyer" was defined here by a unique combination of PacFIN port code and state buyer code on the fishticket. For California, a single company may have several buying codes that vary only by the last two digits. In PacFIN, these last two digits are truncated, and so were treated as separate buying units only if they appear for different ports.

3.2.5 Fishing Communities

Fishing communities, as defined in the MSA, include not only the people who catch the fish, but also those who share a common dependency on directly related fisheries-dependent services and industries. Commercial fishing communities may include boatyards, fish handlers, processors, and ice suppliers. Similarly, entities that depend on recreational fishing may include tackle shops, small marinas, lodging facilities catering to out-of-town anglers, and tourism bureaus advertising charter fishing opportunities. People employed in fishery management and enforcement makes up another component of fishing communities.

Fishing communities on the West Coast depend on commercial and/or recreational fisheries for many species. Participants in these fisheries employ a variety of fishing gears and combinations of gears. Community patterns of fishery participation vary coastwide and seasonally, based on species availability, the regulatory environment, and oceanographic and weather conditions. Communities are characterized by the mix of fishery operations, fishing areas, habitat types, seasonal patterns, and target species. Although unique, communities share many similarities. For example, all face danger, safety issues, dwindling resources, and a multitude of state and federal regulations.

Individuals in unique communities have differing cultural heritages and economic characteristics. Examples include a Vietnamese fishing community of San Francisco Bay and an Italian fishing community in Southern California. Native U.S. communities with an interest in the groundfish fisheries are also considered. In spite of a variety of ethnic backgrounds, fishers in many areas come together to form the fishing communities, drawn together by their common interests in economic and physical survival in an uncertain and changing ocean and regulatory environment.

The EIS has described data pertinent to the identification of fishing-dependent communities. The description of fisheries has included a list of the top ports associated with various fishing activities, and it becomes evident from this information that different regions have a different relative reliance on types of fish species. For example, communities along the Oregon coast tend to be more heavily reliant on groundfish fisheries than many California communities where coastal pelagic species are more important.

3.2.6 Sectors Directly Regulated by Proposed Rule

The previous sections of this document included a description of the socioeconomic environment potentially affected by the alternatives that were considered to protect EFH from fishing. The following table provides a list of fishery sectors that are directly regulated by the proposed rule, and the manner in which they are regulated.

Table 59 Sectors Directly Regulated by Proposed Rule

Sector Description			Regulation Type	
Fleet	Gear	Species or Species group	Area Closures	Gear Requirements
LE	Trawl & demersal seine	Groundfish	X	X
	Hook and Line and Pot	Groundfish	X	
OA	Trawl	Pink Shrimp	X	X
		Ridgeback Prawn	X	X
		California Halibut	X	X
		Sea Cucumber	X	X
	Fixed Gear	Dungeness Crab	X	
		Spiny Lobster	X	
		Groundfish	X	
		California Sheephead	X	
		Pacific Halibut	X	
		California Halibut	X	
		Other bottom dwelling species	X	
	Other Bottom Tending Gear	Groundfish	X	
		Other bottom dwelling species	X	
	Dredge		PROHIBITED GEAR	
	Beam Trawl		PROHIBITED GEAR	
Rec	Bottom tending gear	Groundfish and other bottom dwelling species	X	

Note: an X indicates that type of regulation applies

4 Effects of the Alternatives

This section analyzes the effects of the final preferred alternative consistent with the requirements of EO 12866 (RIR), the Regulatory Flexibility Act (IRFA), EO 12898, and Section 303 (a)(7) of the Magnuson-Stevens Act (practicability). For a description of the alternatives, see chapter 2 of the EIS.

Many of the impact minimization alternatives considered and analyzed within the EIS were designed to achieve the stated objective of protecting EFH while simultaneously minimizing the economic impact to the fishing industry and fishing communities. As stated previously, there are 5 alternatives in addition to the preferred alternative that considered economic impacts as part of their design. These include alternatives C.3.1, C.3.2, C.4, C.10, and C.12.

Alternatives C.3.1 and C.3.2 were designed to close areas to trawling that were not critical to the economic future of the trawl industry by closing areas with fewer than 100 trawl hours. The 100 trawl hours rule was intended to close areas that the trawl industry does not regularly fish while leaving open areas that are more routinely trawled.

Alternative C.4 was designed to protect EFH by limiting future expansion of fishing areas while preserving current opportunities for fishing. Closing areas that have not been previously fished is viewed as an alternative that is expected to keep fishing revenues at status quo levels by leaving open areas that have already been fished.

Alternative C.10 was designed to mitigate the impacts of no-trawl zones through a privately funded vessel and permit buyback system. This alternative proposes closing areas to trawling within a specific project area located off the California coast. To mitigate against revenues that could be potentially lost, a privately funded buyout of trawl vessels in the area was proposed as a compensation measure.

Alternative C.12 was constructed in a manner that took into account current trawl fishing patterns, and proposed closing areas that weren't trawled on a consistent basis. This alternative used available logbook data to determine which areas were important to the trawl fleet on a revenue basis and on an effort basis. Those areas that were routinely trawled or that were the source of large amounts of revenue were taken into account when proposing areas to be closed to trawling.

The final preferred alternative was constructed in a manner similar to alternative C.12. The final preferred alternative took into account trawl logbook data to determine areas that were important to the trawl fleet. Also taken into account was information gained through the public process on areas important to trawl fisheries where logbook data is not readily available. The approach of the final preferred alternative was to leave open areas that are important to groundfish, shrimp, sea cucumber, and California halibut trawl vessels.

A quantitative analysis, based on effects to groundfish trawl revenues, of all impact minimization alternatives is included in Table 60 and discussed in detail below as it assesses the impacts on the key affected group—groundfish trawlers. For a more complete description of the socioeconomic effects of the alternatives, see chapter 4, section 7.3 of the EIS.

In terms of assessing the benefits and costs of the alternatives, Chapter 4 (Section 4.1.2.1) includes the following discussion:

Much of this analysis focuses on the short and long-run cost effect to the socioeconomic environment. The ability to measure the potential benefits of short and long-term habitat protection on West Coast fisheries does not currently exist due to a lack of research and data pertaining to such protections. However, it is accepted that habitat is necessary for the survival of species, and that protecting habitat will foster the continued survival of existing species. Whether protecting habitat from damage will foster an increase in fish populations that will in turn translate into an increase in catch is unknown. In the case of groundfish, this theory is especially questionable since many groundfish species are sedentary, and an increase in a particular fish population may occur in areas inaccessible to fishing gear. For example, closing areas to types of fishing gear may increase the populations of fish species within those areas, but it is questionable whether spill-over effects will occur to areas outside those closed areas when species are sedentary in nature. Without spill-over effects, it is questionable whether increases in catch are likely to occur as a result of an increase in population, and this makes long term fishery benefits as a result of habitat protection debatable. Indeed, the SSC white paper on marine reserves (PFMC June 2004) concluded that perhaps one of the only certain benefits to closing areas to fishing (a tool analyzed in the impacts minimization alternatives) may be the reduction in stock uncertainty due to the existence of more robust stocks (various age groups) within those closed areas. Furthermore, although stock improvements may indeed occur as a result of closed areas, the evidence that a growth in stock would translate into additional fishing opportunities because of spillover from that closed area was still hypothetical and unproved.

The major socio-impacts associated with the alternatives are discussed in Chapter 4 and are reflected in three key tables which are attached below. Chapter 4 includes a discussion of the effects of the alternatives on processors, consumers, communities, non-market values, safety and other issues (See Table 4-1 which is also attached below.) Chapter 4 also discusses the impacts of the alternatives pertaining to impact minimization (See Table 4-3 which is also attached below. Finally, Chapter 4 includes a summary of the social economic consequences of the impact alternatives and on research and monitoring (See Table 4-10).

4.1 Data limitations and Methodology

Data limitations largely preclude a quantitative analysis of the relative economic and socioeconomic impacts of several alternatives. Data deficiencies include the following:

1. Cost and operating structure of the industry
3. Probable operational adjustments and coping strategies (e.g., effort redeployment patterns) that may be adopted by various elements of the industry in response to one or another of the proposed EFH fishing impact minimization alternatives

4. Market demand and price responses to supply shocks (e.g., reduced quantities; changes in timing, quality, or product form; etc.)
5. Affiliation and ownership linkages (both horizontal and vertical), which may influence the economic viability of any given operation following a significant structural change in the fishery that is attributable to adoption of an EFH fishing impact minimization alternative

Therefore, except in the specific case of differential impacts on gross revenues attributable to the preferred alternative, the ability to quantitatively distinguish between the effects of the preferred fishing impact minimization alternative is quite limited within this analysis. With the single exception of gross revenues, the balance of the regulatory impact analysis is primarily limited to characterizing the nature, probable direction, and (in some cases) the likely gross magnitude of attributable economic and operational impacts accruing from the preferred alternative. Impacts have been monetized wherever possible and appropriate.

The only consistent measure of gross revenue impacts is an analysis of limited entry trawl revenues that are displaced as a result of areas that may be put off limits to fishing. These revenues are categorized as “revenues at risk” or “displaced revenues” and are analyzed according to 1) the total gross revenues within 10 minute by 10 minute (latitude and longitude) areas that coincide with areas regulated by a specific alternative, and 2) the revenue proportion of those 10 minute by 10 minute areas that are impacted by alternative. These two approaches are provided to show a possible range of displaced gross revenues, and the best measure of displaced revenues ultimately depends on how regulations are constructed and areas defined.

Displaced gross revenues should not be equated to revenues that are lost. Reductions in catch quotas are not considered under the preferred alternative, and management agencies routinely set seasons to achieve catch limits of target species. For example, the PFMCC’s Groundfish Management Team routinely adjusts monthly and bimonthly catch limits to attain-but not exceed-optimum yields for targeted groundfish species. If a regulation designed to protect Essential Fish Habitat also results in fewer vessels achieving catch limits and lower total harvests, it is likely the Groundfish Management Team would increase monthly and bimonthly catch limits accordingly to raise total catch and gross revenues for the fishery. The result may be that some vessels, processors, and communities are positively impacted while others are negatively impacted. However, it may be reasonable to assume that the more a regulation restricts a fishery, the less likely it is that catch limits will be achieved, and the more likely it is that “revenues at risk” will result in lost revenues.

4.2 Displaced Gross Revenue

This section provides the results of the analysis, described in the above section, of displaced limited entry trawl gross revenues as a result of the alternatives considered within the EIS.

Table 60 Comparison of Protected Area and Trawl Revenues at Risk Over 4 Years by Alternative

DEIS Alternative	Description	% of EEZ	Area (ha)	Area (sq nm)	Revenues at Risk for total 10x10 block areas (\$)	Revenues at Risk for proportioned 10x10 block areas (\$)
C.1	No Action				NA	NA
Final Preferred	Combination of area and gear restrictions	81.72%	67,237,011	196,031	36,292,783	8,523,085
C.10	Central CA No-Trawl Zones	3.48%	2,862,458	8,345	5,886,370	5,644,512
C.11	Relax Gear Endorsements			0	NA	NA
C.12	Close Ecological Important Areas to Bottom Trawl	90.36%	74,350,701	216,769	46,252,563	19,242,920
C.13	Close Ecological Important Areas to Bottom-contacting gear	90.36%	74,350,701	216,769	46,252,563	19,242,920
C.14	Close Ecological Important Areas to Fishing	90.36%	74,350,701	216,769	46,252,563	19,242,920
C.2.1	Depth Based Gear Restrictions Option 1 - Large Footrope Depth Restriction - 200 fm	9.86%	8,109,479	23,643	UNKN	UNKN
C.2.1	Depth Based Gear Restrictions Option 1 - Fixed Gear Depth Restriction - 100/150 fm	8.46%	6,958,174	20,287	UNKN	UNKN
C.2.2	Depth Based Gear Restrictions Option 2 - Large Footrope Depth Restriction – EEZ	100.00%	82,281,491	239,892	UNKN	UNKN
C.2.2	Depth Based Gear Restrictions Option 2 - Fixed Gear Depth Restriction - 100/150 fm	8.46%	6,958,174	20,287	UNKN	UNKN
C.2.3	Depth Based Gear Restrictions Option 3 - Large Footrope Depth Restriction - 200 fm	9.86%	8,109,479	23,643	UNKN	UNKN
C.2.3	Depth Based Gear Restrictions Option 3 - Fixed Gear Depth Restriction - 60 fm	5.62%	4,620,408	13,471	UNKN	UNKN
C.3.1	Close Sensitive Habitat - Option 1	2.19%	1,805,105	5,263	1,011,952	181,973
C.3.2	Close Sensitive Habitat - Option 2	16.85%	13,861,398	40,413	1,531,975	934,794
C.3.3	Close Sensitive Habitat - Option 3	2.70%	2,221,323	6,476	47,115,054	3,723,698
C.3.4	Close Sensitive Habitat - Option 4	23.18%	19,069,623	55,597	82,895,532	58,458,226
C.4.1	Prohibit Geographic Expansion of Fishing - Option 1	82.83%	68,150,527	198,693	88,941	88,941
C.4.2	Prohibit Geographic Expansion of Fishing - Option 2	74.21%	61,060,253	178,021	88,941	88,941
C.5	Prohibit Krill Fishery			0	NA	NA
C.6	Close Hotspots	7.77%	6,389,460	18,628	78,094,177	41,622,276
C.7.1, C.7.2	Close Areas of Interest	3.67%	3,017,148	8,796	29,471,349	12,601,536
C.8.1, C.8.2	Zoning Fishing Activities, options 1 and 2	74.21%	61,060,253	178,021	UNKN	UNKN
C.9	Gear Restrictions			0	NA	NA

4.3 General Qualitative Practicability Analysis of the Preferred Alternative

The final preferred alternative includes management measures that regulate gear types that are most destructive to habitat, and areas most sensitive to fishing impacts. This group of management measures may minimize adverse impacts to EFH while doing so in a way that is not too costly to the fishing industry. If additional measures had been included, the cumulative impact of implementing all the measures would have been cost-prohibitive to the industry.

The final preferred alternative is practicable because it provides a balance of socioeconomic costs and benefits to the fishing industry and communities, impacts to management and enforcement agencies, and protection of habitat and biodiversity. The result is a suite of impact minimization measures that protects a diverse set of habitat types—thereby protecting EFH and biodiversity—and is most heavily focused on the bottom trawl sector by excluding areas from bottom trawling. Other fishing gears are also excluded or limited depending on the habitat, the geographic area, opportunities for research in those areas in order to further the science and management of habitat, and the amount of information known about areas and gear/habitat interaction.

Several interested parties participated in the development of the preferred alternative including (but not limited to) the fishing industry, communities, and environmental organizations. While the development of the EIS included a robust search of available habitat and fishery data, there are still gaps in existing information, including, spatial fishing information does not include all fisheries potentially impacted by EFH protection measures, and the location of habitat types is largely only available to the extent that it has been documented and identified. One example where information was needed from the fishing industry included the likely impact of proposed area closures on fisheries where spatial data is not readily available. Spatial data exists for the limited entry groundfish trawl fleet, but equivalent data does not exist in a readily available fashion for shrimp trawl vessels, and some alternatives within the EIS include restrictions on all types of bottom trawl gear. In order to close the gap on the lack of information for the shrimp trawl fleet, and to reduce the socioeconomic impact upon the shrimp trawl fleet to a reasonable level, input was acquired from the fishing industry through public comment, and through the Council process regarding areas that are important to the shrimp trawl fleet. This information was used in conjunction with habitat information to craft a suite of areas closed to trawl gear that protects EFH while minimizing the socioeconomic impact to fisheries impacted by those management measures.

4.4 Detailed Qualitative Practicability Analysis of the Preferred Alternative

Socioeconomic Effects to Recreational and Commercial Fisheries, Processors and Communities

Although the preferred alternative closes certain areas to bottom trawling and other bottom tending gear types, it should be noted that these measures do not reduce catch quotas. Harvest put at risk by closed areas may be made up elsewhere. If closing certain areas to certain gear types appears to impact catch, then as a regular part of inseason management, the Council could be reasonably expected to increase vessel catch limits and recreational opportunities so that those fishers that are able to achieve revised catch limits and seasons will make up for the aggregate decline in catch. However, the more effort and revenue is displaced, the more likely it is that displaced revenues and effort will also translate into lost revenue and effort.

The preferred alternative is expected to displace approximately \$8.5 million in bottom trawl groundfish revenues over a 4 year period, which is expected to be less than 10% of total bottom trawl groundfish revenues over that same time. This amount of displacement should be considered minor since catches of target species in the bottom trawl fishery routinely vary by equivalent amounts on an annual and monthly basis. In addition, the preferred alternative displaces revenues along the entire coast, meaning that no single community or region bears a disproportionate amount of displaced revenues. As stated above, displaced revenues are not synonymous with lost revenues. The preferred alternative does not reduce catch quotas, and the Council can be reasonably expected to adjust fishery management inseason to compensate for changes in catch that might occur. Thus, on a fishery-wide basis the preferred alternative is not expected to result in a change in the aggregate level of catch and gross revenues and is a practicable from that standpoint.

Impacts to processors and communities would occur if there is a reduction in revenues and landed catch associated with the closures occurring under this option. As indicated above is unknown if portions or all of the revenues and pounds put at risk will be lost. Therefore, the effect to communities and processors is unknown, but on a fishery-wide basis the preferred alternative is not expected to result in the aggregate level of catch and gross revenues. It should also be noted that, that should there be effort shifts, some processors and communities may gain and others may lose revenues as the total harvest of fish coastwide is not expected to change. As the location of the various areas closed to bottomfishing, bottom contact, and all fishing are dispersed throughout the coast, this dispersion also mitigates against any one community and associated processors from bearing an disproportional impact from habitat mitigation measures.

Trawl Area Closures

It is generally understood that bottom trawl gear has the greatest degree of impact on benthic habitat. As a result, within the preferred alternative, the bottom trawl sector is subject to the most restrictive set of regulations on an area basis when compared to other gear types. Restrictions on bottom trawl vessels protect a wide range of habitat types along the continental shelf, slope, and the abyssal plain. The abyssal plain closure-along with some areas closed along the continental slope-include areas closed to trawling which have not been previously been trawled. This is viewed as a precautionary measure, and is done because: (a) there is a lack of information on the importance of habitat in this area; (b) bottom trawl gear has the potential to adversely impact EFH; and, (c) closing this area is likely to have minimal or no impact on bottom trawl vessels since this area has not been fished by those vessels. In addition to these area closures, bottom trawl vessels are prohibited from using roller gear larger than eight inches along the majority of the continental shelf. This effectively discourages trawling in areas with more severe and hard substrate, yet has a minimal impact on the bottom trawl sector since a large footrope prohibition is already in place under status quo management as a bycatch reduction measure.

In order to monitor compliance with trawl area closures, a Vessel Monitoring System (VMS) will be needed on vessels that do not currently have a VMS. These vessels will incur costs that are on the order of \$1,550 - \$5,295 to purchase a unit; \$120 of annual maintenance; and \$1 - \$5 per day for the cost of transmitting location (NMFS July 2003).

Bottom-Tending Gear Area Closures

Additional areas are closed to all bottom tending gear types. These areas include the Davidson seamount, the Cordell Bank within the Cordell Bank National Marine Sanctuary, and areas within the Channel Islands National Marine Sanctuary. Areas within marine sanctuaries are closed to bottom tending gear types because of the minimal expected impact to the recreational and

commercial fishing industry (these areas represent a small portion of the area fished by bottom tending gears), those areas are deemed unique habitats, and the enhanced opportunities for research by marine sanctuaries because of additional funding provided by the sanctuaries.

Based on information received from public comment and the Council process, the Channel Islands closed areas are expected to displace the largest amount of commercial and recreational effort, followed by Cordell Bank, and Davidson Seamount respectively.

Channel Islands Closures

Several commercial fisheries that use bottom tending gear occur within the California bight area, and these fisheries are expected to be impacted by these closures. These fisheries include dive gear and fixed gear fisheries. Furthermore, the southern California region has the largest estimated number of recreational anglers, and while not all of these anglers use gear that is considered bottom tending gear, it is likely that many of these anglers will be impacted by the Channel Islands restrictions.

Cordell Bank Closure

According to information from the Cordell Bank NMS, some commercial fishing has occurred within the Cordell Bank area in the past. However, the Cordell Bank is currently protected from groundfish fishing effort through the implementation of the Rockfish Conservation Area – a closed area designed to minimize bycatch of overfished species, so impacts to commercial fisheries are expected to be minimal since EFH protection measures mirror status quo management. Recreational fishers are likely to be affected by the closure of Cordell Bank to bottom tending gears. Although it is unknown how important this area is to recreational fishers, it is reasonable to assume that the impact will be minimal because this area is relatively small when compared to other fishable area.

Davidson Seamount Closure

The Davidson seamount closure is expected to have little or no impact to current fisheries. There is no information suggesting this area is routinely fished by either commercial or recreational fishers using bottom tending gear. Although vessels target HMS fish within the area, the depth of the restriction is not expected to impact their fishing activities since HMS vessels focus their efforts on depths closer to the surface.

Impacts to Management and Enforcement Agencies

These area closure restrictions will require more monitoring and enforcement on the part of enforcement agencies. Area closures can be effectively monitored and enforced through the use of Vessel Monitoring Systems (VMS), and the preferred alternative requires that bottom trawl vessels fishing in the EEZ carry VMS. Other restrictions are more difficult to enforce and may require agents to actively visit portions of the industry-both at sea and shoreside-to ensure compliance with gear restrictions for example.

The fact that proposed management measures within the preferred alternative differ along the coast means that there will be differential impacts on enforcement agents along the coast. In general, area restrictions tend to be less cumbersome in the northern portions of the Pacific coast EEZ (off the coasts of Washington, Oregon, and northern California) where restrictions are limited to the bottom trawl fleet. Off of central and southern California, area closure boundaries are more complex and apply to more gear types. These complex boundaries will require more vigilant efforts on the part of agents monitoring VMS.

Population and Ecosystem Effects

The preferred alternative protects a wide array of habitat types along the continental shelf and slope from potential adverse impacts of fishing. Protection of multiple habitat types helps to ensure the continuation of biodiversity in the marine environment by protecting biogenic habitat, species reliant on biogenic habitats and other habitats protected in those areas, and by reducing the probability that species residing in those areas will be caught. The protection of EFH and the species within those areas may have positive population effects if those species are sedentary in nature. This is because the protection of species in those areas may act as insurance against stock collapse, and helps to insure a minimum population size of a coast wide population of fish species, if some of those species spend the majority of their lives within those closed areas. Many groundfish species are sedentary, and therefore, the final preferred alternative is likely to have positive population effects.

Changes to Essential Fish Habitat

The preferred alternative protects essential fish habitat by imposing regulations on multiple sectors of the fishing industry and reducing fishing access to areas deemed sensitive to fishing impacts. The protection of essential fish habitat insures that EFH will not be adversely affected by future fishing activities, and allows habitat to regenerate to the extent that habitat can regenerate itself. At a minimum, the preferred alternative can be considered to have a neutral impact on groundfish EFH and will foster the continuation of the current state of groundfish EFH within the EEZ off the Pacific coast. However, it is more likely that the preferred alternative will have a positive impact to habitat as biogenic and other habitat types within areas protected from fishing regenerate.

4.5 Number and Description of Affected Small Entities

The entities that would be directly regulated by this action are those that operate vessels fishing for groundfish, California and Pacific halibut, crab and lobster, shrimp, and species like groundfish such as California sheephead and white croaker in federal EEZ waters off of the Pacific coast. Although harvest and gross revenue information is confidential for individual vessels, only vessels fishing and processing offshore are not considered small entities, meaning all shorebased vessels fishing off the Pacific coast are considered small entities for purposes of this IRFA. Although the number of vessels engaged in shorebased Pacific coast commercial fisheries will vary by year, the average is approximately 3,800 to 4,300. Of these, approximately 1,500 to 1,200 participate in groundfish fisheries; 1,200 to 1,400 participate in crab fisheries; 215 to 330 participate in shrimp fisheries; and 1,404 to 1,642 participated in fisheries not included in the groundfish, crab, highly migratory, coastal pelagic, shrimp, salmon, or shellfish groupings. Many of these vessels participate in multiple fisheries. Less data is available for recreational charter vessels, but in 2000 there were an estimated 635 recreational charter vessels operating along the west coast (PSMFC. 2000. West Coast Charter Boat Survey, Summary Report. http://www.psmfc.org/efin/docs/WCCBSR_report2.pdf), and in 2001, there were an estimated 753 charter vessels operating along the west coast (NMFS 2004). Many vessels participating in these fisheries will be directly regulated by the proposed rule. That is, those directly regulated are those small entities that have fished or will potentially fish in the 34 areas closed to bottom trawling, the 16 areas closed to bottom contact gear, and the areas being proposed to be closed to all fishing. Also directly affected are those entities that will be required to employ VMS devices (those trawlers who do not already fish under a limited entry groundfish permit) and those fixed gear operations that will need to stow their gear upon transiting any of the areas closed to bottom fishing, bottom contact gear, or fishing mentioned above.

4.6 Recordkeeping and Reporting Requirements

Measures to protect EFH from fishing impacts depend on the regulation of the location of fishing activities for vessels using bottom tending gear in the waters off the Pacific coast. This is especially the case for vessels using bottom trawl gear, and to a lesser degree, other bottom tending gears. While traditional methods of monitoring compliance with fishing regulations will work to some degree under the fishing impact minimization alternatives, an electronic VMS is generally acknowledged to be the most effective mechanism for monitoring and enforcing complicated geographic area fishing closures. VMS equipment costs \$1,550 - \$5,295 to purchase a unit; \$120 of annual maintenance; and \$1 - \$5 per day for the cost of transmitting location (NMFS July 2003), although many vessels in the affected fisheries already have and use VMS. Requirements for the use of VMS on all bottom trawl vessels is being pursued under a separate, and parallel rule making process. In 2004 there were 216 bottom trawl vessels operating on the west coast, and through the fall of 2005 there were 207. Of these vessels, approximately 122 carried a VMS system in 2004, and approximately 125 carried a VMS system in 2005, meaning that an additional 82 to 94 bottom trawl vessels may be required to carry VMS in the future.

Chapter 4 Socioeconomic Tables

Socioeconomic Table 4-1: Summary of Criteria for Evaluating Socioeconomic Consequences of the Alternatives.

Component of the Socioeconomic Environment	Analyses	Variables used to assess impact
Fisheries	Trawl revenues put at risk, quantitative and qualitative discussion of other sectors	Change in gross revenues, costs, distribution of effects, revenues put at risk, and impacts on other fisheries
Processors and Buyers	Qualitative discussion of impacts and analysis of changes in landed catch volume where able	Available product type and volume
Consumers	Qualitative analysis of changes in market price, product availability	Availability of seafood and changes in market price
Safety	Qualitative analysis of changes in incentives related to safety and ability to pay for equipment	Injury and fatality at sea
Management and Enforcement	Discussion of changes in demands placed upon relevant agencies	Administrative burdens
Communities	Identification and discussion of factors that may affect communities	Employment and income
Non-market values	Identification and discussion of factors that may affect non-market values	The public's perception of future ecosystem viability
Non-fishing values	Identification and discussion of factors that may affect the economic viability of non-fishing sectors	Financial burdens imposed through the consultation process

Socioeconomic Table 4-3. Summary of Impacts on the Socioeconomic Environment for Council Preferred Alternatives Pertaining to Impact Minimization

Alt.	Portion of the Socioeconomic Environment					
	Fisheries	Management and Enforcement	Processors	Communities	Consumers	Safety
C.4.1	\$88,941 of revenues at risk. Eliminate potential for fishery expansion. More vessels may need VMS	Agencies would need to verify compliance with unfished area boundary	Little or no expected effect	No expected effect	No expected effect	Safety may be enhanced if additional vessels are required to carry VMS
C.4.2	\$88,941 of revenues at risk. Eliminate potential for fishery expansion. More vessels may need VMS	Agencies would need to verify compliance with unfished area boundary	Little or no expected effect	No expected effect	No expected effect	Safety may be enhanced if additional vessels are required to carry VMS
C.9	Vessels may be required to incur additional costs. May displace some small fisheries	Agencies would need to verify compliance with equipment and area requirements	Little or no expected effect	No expected effect	No expected effect	No expected effect
C.10	\$5,044,512 - \$5,886,370 of revenues at risk. Additional vessels may need to carry VMS	Agencies would need to verify compliance with trawl closures	Processors near project area negatively impacted if landings decline	Communities near project area negatively impacted by reduction in landings & revenue	No expected effect	Safety may be enhanced if additional vessels are required to carry VMS
C.11	Non-negative effect on fishing revenues. Slope trawl effort may decrease	Difficulties in predicting and managing target and non-target species. Increased probability of disaster tows	Non-negative impact expected if landed volume doesn't change. If volume changes, effect unknown	Non-negative impact expected if landed volume doesn't change. If volume changes, effect unknown	No expected effect	Non-negative impact expected. If vessel revenues increase, safety may benefit
C.12	\$18,471,193 - \$44,198,927 of revenues at risk. More vessels may need VMS.	Agencies would need to verify compliance with additional closed areas	Processors may be negatively impacted if revenues at risk are partially lost	May be negatively impacted if there are reductions in landed catch and net revenue	No expected effect	Safety may be enhanced if more vessels carry VMS, but may decrease if revenues decrease
C.13	\$18,471,193 - \$44,198,927 of revenues at risk. More vessels may need VMS.	Agencies would need to verify compliance with additional closed areas	Processors may be negatively impacted if revenues at risk are partially lost	May be negatively impacted if there are reductions in landed catch and net revenue	No expected effect	Safety may be enhanced if more vessels carry VMS, but may decrease if revenues decrease
C.14	\$18,471,193 - \$44,198,927 of revenues at risk. More vessels may need VMS.	Agencies would need to verify compliance with additional closed areas	Processors may be negatively impacted if revenues at risk are partially lost	May be negatively impacted if there are reductions in landed catch and net revenue	No expected effect	Safety may be enhanced if more vessels carry VMS, but may decrease if revenues decrease

Socioeconomic Table 4-10: Summary of the Social and Economic Consequences of the Impacts Minimization and Research and Monitoring Alternatives.

Direction of Alternative Impacts on the Socioeconomic Environment															
Environmental Component	Past and Present	External and Non-Fishing Factors	Reasonably Foreseeable Future	Impact Minimization											
				1	2	3	4	5	6	7	8	9	10	11	12
Trawl Fisheries	Many trawl fisheries have been constrained by rebuilding species. Buyback will help many vessels increase revenues. Fixed gear revenues have increased due to tier and permit stacking. Rebuilding species constraints are expected to continue.	Unknown	Rebuilding species constraints are expected to continue. Other fishery opportunities are expected to increase	0	E-	E-	0	0	E-	E-	E-	E-	U	E-4E+	E-
Fixed Gear Fisheries	Fixed gear revenues have increased due to tier and permit stacking. Rebuilding species constraints are expected to continue.	Unknown	Constraints due to rebuilding species are expected to continue	0U	E-	E+ E+	0	0	E-	E-4	0E-	E-	U	E-4E+	0
Recreational Fisheries	Recreational fisheries have been expanding, but are constrained by rebuilding species. Future growth is unknown.	Unknown	Recreational fisheries will continue to be constrained by rebuilding species. Future growth is unknown.	0	0	0	0	0	E-	0E-	0E-	E-	U	0	0
Tribal Fisheries	Tribal groundfish fisheries have been expanding.	Unknown	Tribal fisheries are expected to continue expanding.	0	0	0	0	0	0	0	0	0	0	0	0
Other Fisheries	Conditional. Some fisheries have been expanding, while some have been contracting due to rebuilding species concerns.	Unknown	Rebuilding species will continue to be a constraint.	0	0	E-	0	0	E-	0E-	0E-	E-	U	0	0
Consumers	Consumers have been consuming increasing amounts of seafood. Safety has been generally increasing	Unknown	Consumers are expected to continue consuming more seafood. The number of fishing-related accidents are expected to continue decreasing.	0	0	0	0	0	0	0	0	0	U	0	0
Safety		Unknown	The number of fishing-related accidents are expected to continue decreasing.	0	U	E+	E+	0	E+	E+	E+	0	U	U	0
Buyers and Processors	Groundfish buyers and processors have been consolidating in recent years.	Unknown	The supply of groundfish to buyers and processors is expected to remain relatively stable.	0	E-	0	0	0	0	0	0	0	0	0E+	U
Communities	Many coastal communities are becoming less reliant on fishing-related activity	Unknown	As coastal economies grow and diversify, their reliance on fishing will continue to decrease.	0	0	0	0	0	0	0	0	0	U	0E+	U
Management and Enforcement	The level of management and enforcement needed for recent management actions have been increasing in complexity	Unknown	The current level of management and enforcement is expected to continue	0	U	E-	E-	E-	E-	E-	E-	E-	E-	E-	E-
Non-Fishing Activities	The trends in non-fishing activities are unknown.	NA	Unknown	0	U	U	U	U	U	U	U	U	U	U	U
Non-Fishing Values	The trend in non-fishing values has likely been negative	Unknown	Unknown	U	U	U	U	U	U	U	U	U	U	U	U